SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE OFFICIAL NOTICES AND PROCEEDINGS OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

FRIDAY, APRIL 20, 1906.

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MSS. intended for publication and books, etc., intended for review should be sent to the Editor of SCIENCE, Garrison-on-Hudson, N. Y.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

SECTION I—SOCIAL AND ECONOMIC SCIENCE.

THIRTY-FIVE papers were on the printed program, of which seventeen were read in person, seven by title with abstracts of contents presented and eight papers were never forwarded by the authors, for various reasons. The statistical paper by Professor Arthur Lefevre on 'Public Education in Texas,' arrived too late for use.

Professor W. R. Lazenby's paper on 'Relations of Forestry to Soil and Climate' will appear in the *Proceedings* of the Ohio State Forestry Society at some future date.

The paper read by Professor Bruce R. Payne, University of Virginia, on 'The Social Service of the Public High School,' will also be published later.

Attendance at the meetings ranged from fifteen to fifty persons. Holding the sessions at the board of trade rooms was a mistake. The business people did not attend, and we were too far away from the other sections to admit of their members attending.

The following officers were elected:

Sectional Committee—Irving Fisher, Charles A. Conant, Carroll D. Wright (five years), E. L. Corthell (four years), W. R. Lazenby (three years), Frank A. Rutter (two years) and B. E. Fernow (one year).

Member of Council—Marcus Benjamin.

Member of General Committee—Le Grand Powers.

Possibilities of Cotton Warehousing from the Producer's Standpoint: EUGENE WILLIAMS, Waco, Texas.

An elementary principle in political economy is that the raw product should remain at the most available market nearest its field of production until required for actual consumption. Such a policy will save to the cotton belt losses estimated at over $100,000,000 annually from country damage, waste, violent fluctuations in prices, and other unbusiness-like results. The country damage alone to the crop of 1904–5 is estimated at from $5,000,000 to $10,000,000, an amount sufficient to erect a most efficient warehouse system throughout the entire cotton belt. To save these losses for the next and all succeeding crops a warehousing system should be established. This weather damage is a slight loss compared with the costly results which follow the inexperience of farmers as salesmen and the outrageous effects upon the market brought about by artificial influences.

The prices actually paid for single bales of cotton on the streets of a country market town, contrasted with the prices received by farmers who concentrated their several small holdings in a small galvanized iron warehouse in the same town, show that this single warehouse, by bringing under its friendly control a few hundred bales of cotton offered and sold in lots, realized from one eighth to one third of a cent per pound, or from 60 cents to $1.60 per bale, more than if sold by the single bale on the farmer's wagon. This rate of increase in price would realize from six to sixteen million dollars on the entire crop.

Therefore, I favor erecting a small warehouse in every town marketing approximately 1,000 bales of cotton, or over, annually, as contrasted with a few large city warehouses, because: (1) The farmer would be willing to hold his cotton in his market town, but would not be willing to ship it to a distant city warehouse; (2) the farmer would sell his cotton at a loss rather than ship to a distant city warehouse; (3) a local warehouse full of farmers' cotton would bring the increase in price to the farmer, whereas the large city warehouse, full of exporters' cotton, would not help the farmer who produces it; (4) the local warehouse full of farmers' cotton would bring to the local banks for deposit the increased volume of money flowing from the excess in price received by the farmer for his cotton; (5) cotton held by farmers in local warehouses would provide for local banks the best possible collateral for farmers' loans to carry the cotton; (6) the increase in deposits and choice collateral for loans would tend to decrease the rate of interest and multiply manifold the local bank's volume of business and its profits, while serving its customers better and upbuilding its home town; and (7) small warehouses would do more to encourage cotton mills in the cotton belt than all other influences combined. Large warehouses at distributing centers would take care of themselves.

Factors Determining the Price of Sugar: Dr. Frank R. Rutter, Washington, D. C.

The remarkable increase last year of 50 per cent. in the price of German raw sugar for exportation was due to a decrease of only 7½ per cent. in the total sugar production of the world. The price of clarified sugar in New Orleans advanced over one cent a pound, but this year has returned to its former level.

The main part of the paper deals with deviations in the sugar prices of the United States from the world prices as represented by German quotations for export sugar. It is shown that the tariff reductions in favor of sugar from particular islands—from Cuba, Hawaii, Porto Rico and the Philippines—has considerably depressed prices for raw sugar in the New York market during the months from December to June,

of each year, when these sugars usually more than suffice for the requirements of refining. Louisiana sugars are at a disadvantage from being marketed within this period. From 80 per cent. to 85 per cent. of the total receipts of New Orleans are sold in November, December and January. Besides this, the prices for refining grades are then invariably reduced, from thirteen to nineteen cents per hundred pounds below New York quotations, simply because it would cost approximately that amount to ship Louisiana sugar to New York. But this is merely a relic of the time when large quantities of the Louisiana product were shipped by water to the Atlantic ports. It does not seem to be justified under present conditions, when New Orleans possesses large refineries, has more advantageous freight rates than New York to interior territory, and annually imports between March and September, from 100 to 500 million pounds of foreign sugar. The depression in the price of raw sugars by no means causes a corresponding reduction in the price of refined, which is almost uniformly kept above the price at which German refined sugar could be imported after paying the full customs duty.

Relation of Higher Education to the Economic Development of the South: Chancellor J. H. KIRKLAND, Vanderbilt University, Nashville, Tenn.

The relation of economic development to education is most intimate. The work of the world is done by mind, not muscle. There is not enough muscular power available to reap the wheat crop of a single year. Universal elementary education is the first condition of material progress. Industrial training is also desirable for a large class of our population, but such training should develop the head as well as the hand.

1. Universities have largely modified their courses in response to the demands of practical life. Professional courses are offered for the training of engineers, chemists, electricians, manufacturers, and in every science applied courses open to all students the new lines of industrial development. Universities contribute to economic development by fundamental instruction in the general principles of science. Abstract mathematical research lies at the foundation of every science.

2. Universities contribute to economic development also through work done in philosophy, history, political science and economics. We need, as industrial leaders, men of broad sympathies and wide vision. The application of ethics to industry is as important as a new invention or an improvement in machinery.

3. Universities should also propagate sound economic doctrine. They should educate the public. Political education must be coextensive with the ballot. Economic fallacies are peculiarly dangerous when they receive a political embodiment.

4. So far as the south is concerned, its universities have been too poor to fulfil the tasks outlined. Scientific instruction is still meager, and our laboratories poorly equipped. But little is done in the departments of history, economics and political science. The south should take advantage of the experiences of other sections in achieving its great economic progress. For example, we do not need to build up our factory system on the pernicious fallacy of child labor. This question has been fought out in old England and New England. The south has learned the failure of slavery as a source of wealth and child labor is not far removed from slave labor.

5. Politically the south has inherited the spirit of leadership and the traditions of good government. But we, too, have built up an art of politics and developed our machines. We have deified party fealty.

But we have yet to work out the reign of intelligence in political life. We have yet to learn that our chiefest political issues are clean, honorable, frugal and efficient administration of the simple duties of public office. We have yet to learn the intimate relation between righteousness, intelligence and economic prosperity.

Teaching Agriculture in Rural Schools: Professor W. F. Massey, North Carolina Agricultural Experiment Station, Raleigh, N. C.

1. The agricultural colleges have been greatly handicapped in their development of efficiency for want of preparatory courses in agriculture in the secondary schools.

2. Though the time is not yet ripe for the general establishment of district schools for agriculture, the great need of the times is some elementary instruction in the form of branches of study applicable to the work of the farm.

3. The next great need is the training of teachers. This is beginning to be met by summer-school courses at our colleges of agriculture. School children's interest should center not only on the natural productions of the locality, but also on the study of the soil, methods of tillage, influence of sunshine, rain and the weather generally on plant life and growth. At the St. Louis Exposition 8,000 specimens of corn were exhibited which that number of boys in Illinois had raised, 1,250 of whom took prizes ranging from 50 cents to $500.

4. The south needs this work especially, and must begin with a kind of kindergarten work with the youngest, to be followed by the school garden work for the older or more advanced pupils. The children of the farmer will see in this occupation the future which they seek—a future which will keep them not only from forsaking the old homestead, but result in multiplying homesteads, where abandoned fields now await the magic touch of scientific intelligence.

Some Problems of Agriculture in Texas: Professor G. S. Fraps, Texas Experiment Station.

The problems of Texas are on the whole those of a rapidly developing country, a search for men, money, crops adapted to the soil and markets to sell them. The maintenance of the soil fertility is beginning to be of importance. The cotton men have the boll weevil, the boll worm, dead cotton; the rice men, to institute a rotation and soil treatment which will maintain the productiveness of their soils. The cattle men are improving their stock. Fertilizers are being used, and their use is increasing.

Utilization of the By-products of the Cane-sugar and Rice Mills: Professor W. R. Dodson, State Experiment Station, Baton Rouge, La.

Louisiana leads all other states in the union in the production of these by-products, and has done more than has been done elsewhere in determining their real value and encouraging their utilization.

There are three main by-products in the rice mills of Louisiana: rice hulls, rice bran and rice polish. Rice hulls are practically of no value as foodstuffs, while rice bran and rice polish are of great value as such. Rice polish is now worth from $22 to $24 per ton, and it ranks high as a concentrated foodstuff. Compared with wheat bran, it contains 20 per cent. more digestible carbohydrates and 4 to 4½ per cent. less digestible protein. Rice polish is very valuable foodstuff for swine. Rice bran has been greatly adulterated as it rose in public estimation and in value as foodstuff. The adulteration is principally with ground rice hulls, which are practically of no value as food. Sometimes mixed rice and wheat bran are found for sale on the markets in

Louisiana, being sold as pure wheat bran. In these instances analysis reported on rice meal indicated that there had been an addition of rice hulls. The law in Louisiana, which has been in existence for about one year, requiring the manufacturer to tag each sack of bran, giving the composition of protein, carbohydrates, fat and fiber, has served to some extent to check the wholesale adulteration of rice bran.

With regard to the by-products of the sugar mills, molasses, which a few years ago was held to be refuse, and was either given away to be taken out of sight and out of the way, and which often was dumped into the plantation ditches, is now considered a most valuable ingredient in the feed of stock, and is worth at least $8 per ton.

Relation of Schools to Civic Improvement: LOUISE KLEIN MILLER, Curator of School Gardens, Cleveland, Ohio. (Illustrated by stereopticon.)

An instructive description of work done in Cleveland, under public school auspices, with private cooperation, by which many vacant lots were transformed into flower beds and vegetable gardens, especially in portions of the city where such properties are often neglected or used as dumping grounds. Back yards, from being cheerless and uninviting, by proper encouragement of the young as well as the aged, became sources of enjoyment where the first lessons of horticulture and vegetable gardening were learned, thus contributing to the pride and pleasure of the people in their homes as well as to the health and beauty of the neighborhood.

At the end of five years the Home Gardening Association, through which this work is developed, finds its work more widely known and its aim better understood. This is manifest in a number of ways. The occupant of a small house is furnished an incentive to make the yard attractive. The real-estate dealer recognizes the improvement in the appearance of property and appreciates the consequent increase in values. The teachers and school officials, almost without exception, concede the vital interest aroused in the pupil and are ready to make use of this aid to school work. People concerned for the improvement of city conditions are satisfied that this is one of the effective means to secure that most desirable result. Inquiries from other communities are increasing, and, in a number of instances, work along similar lines has been started.

Southern Cotton-mill Workers: Their Condition and Needs: Rev. J. A. BALDWIN, Piedmont Industrial School, Charlotte, N. C.

Before the war the poor white people had very meager educational advantages, and consequently most of them were illiterate. Much has been done for their descendants at the mills, but so much still remains to be done that the situation is really appalling. The public schools are to be found at every mill, and are doing much good, but there is much to be done which they are not doing and can not do. Some kindergartens have been established. There ought to be many more. With shorter hours of labor, which are sure to come, special impetus will be given to night classes. But there are thousands of young people who can not read and write, and very few of the others can do much more. They have in them wonderful possibilities, as evidenced by the fact that most of the superintendents and practically all the room overseers have come right up from the lowest places in the mill. These young people are beginning to be interested in education. They are awaking from the sleep of generations. But there are no schools that suit them.

They are too old to go into the schools

for young children. They must have their needs met in other ways. In addition to common school courses suited to their needs the boys should have a textile course, and the girls a course in domestic science. The more favored classes have their colleges and universities; the negroes have their Hampton, their Tuskegee and other schools. The cotton-mill people of the south have nothing. A thoroughly equipped boarding school, giving the course as indicated, with expenses low, and giving opportunity for students to work part of the time in the mill and on the farm, will prove of incalculable service to humanity. Such a school has been established as a private enterprise at Charlotte, N. C., the center of the cotton-mill industry in the Piedmont section. After two years the school has an enrollment of 120 pupils. It is working with an endowment of 277 acres of land located in a rapidly growing suburb, where many of the students work half of their time in the mills and attend school the other half. Mr. Baldwin's intention is to establish later, if possible, a small cotton mill, where the students can put in a portion of their time working out their tuition. The curriculum has been arranged with a view of adaptation to the needs of the operatives and includes courses in English branches, textile training, agriculture and domestic science.

Industrial Training and the Negro Problem in the United States: Principal E. L. Blackshear, Prairie View, Texas.

Herbert Spencer's conception of education as the correlating of the human unit to his physical and social environment has grown into the modern complex notion and system of industrial training which is physical on one side and intellectual and moral on the other. Objectively, it is the training of muscular energy and sense-perception in intelligent physical process, directed to a final cause or end; the realization of the ideal; the training of hand and eye. Subjectively, it is the discovery of the means, methods and process by which the ideal is to become real and useful, involving the exercise and development of observation, analysis, discrimination, criticism, choice and will; the formation of the work-habit, with its properties of persistence and fidelity; and the creation of character, with its endowments of self-control, self-culture and self-support in their relation to serviceableness to the general good.

It is obvious that this form of training is just that needed to adjust a primitive people like the ex-African negroes to highly specialized industrialism of the American politico-economic system; it is the training, too, that must be applied to the Filipino and to the African natives if these backward peoples are to become progressive and self-sustaining.

This theory was first put into practise by General Armstrong in a system of training for the emancipated blacks at Hampton, Va. This work gave birth to the Tuskegee Institute, under Booker T. Washington, and established a system of manual and industrial training for the blacks on the only principles which give reasonable promise of a solution of the negro problem involving the enhanced value of the race to American society.

As evidence that it is worth while we cite proofs for the productive value of negro labor. The negroes are doing the bulk of the hard, undesirable labor of the south in all lines—its menial, agricultural and heavy contract work, track-work, grading and excavating, heavy mill and foundry work, and the work of the stevedore. They do some of the work of the mechanic and probably the bulk of the hard work connected with the culture of cane, cotton, sugar, tobacco and rice.

Further, negro labor is the most effective

cheap labor and the cheapest effective labor the south can get; and the whole country is calling for labor. If it were not for European emigration, the United States would be at a great economic disadvantage. But immigration may not continue always and in the keener competition of the future between the commercial nations, the labor of the negroes may be very useful.

As to the relation of training for negroes to the race problem, that is to the problem of how best to maintain normal and helpful relations between the whites and the blacks, it can be said that industrial training will help to better relations by making negro labor useful to the white employer of labor and hence more necessary to the successful conduct of the business and industrial operations of the south. The chief complaint made against negro labor has been that it is not prompt and not regular, faults which training will remedy.

By way of summary, the applicability of industrial training to a race in the condition of the negro; the industrial capacity of the race as shown by the African tribes and ex-African slaves; the testimony of the existing poorly equipped negro industrial schools; the present distribution of negro laborers among American industries and their relative success in them; the extent to which the south uses negro labor in domestic, industrial and agricultural lines; the large acreage of southern farm lands worked by negro farm labor; the large per cent. of negroes engaged in the useful industrial pursuits in all parts of the Union; the eagerness of the negro youths to secure industrial training; the sentimental and historic obligation of the American people to the blacks in view of their responsibility for their presence in America; the economic debt the nation still owes them for generations of unrequited labor and for tremendous present values accruing from that labor—these and other considerations point to industrial training as the need of the hour for the negro people, and as the solution of the race problem, as well as to the duty of the nation through federal agency to make provision for the establishment of a chain of schools to accomplish this great and beneficent purpose.

Social Work of the General Federation of Women's Clubs: Mrs. A. O. GRANGER, Chairman Child Labor Committee, Cartersville, Ga.

The General Federation was organized by Sorosis in New York City in March, 1889, and now includes working clubs in Alaska, England, India, China, Hawaii, Mexico, Porto Rico, Chili and Western Australia. The central point toward which all its work tends is the *child.* The men and women of to-morrow are the children of to-day, and everything that tends to make the conditions of child-life better is of importance. As a federation it seeks to coordinate the great variety of women's clubs upon this central aim, and its policy is best expressed by its motto—unity in diversity. It seeks to enable the less fortunate to share the enjoyment of the better things in our civilization. It avoids fields already covered by social effort and trains its members to fill the gaps and to do the work neglected by others.

Among its most active committees are one to develop true art in school work; another to further the use of good literature, working with the committee on library extension among our schools; a third on household economics for the better conduct of home affairs from the business standpoint. The pure food committee quickens the public conscience against adulteration. The civic committee occupies itself with several lines of work—sanitation, training for citizenship, municipal morality and the beautification of the city. Its committee on civil service reform helps to mold the

sense of official honor. The committees on forestry, on education, industrial conditions, on child labor, have helped to develop an enlightened public opinion on all these vital questions in an effort which covers the entire country.

Progress of the Negroes of Virginia as Property Owners: Charles E. Edgerton, Washington, D. C.

This is an examination of the rate at which property has been acquired by the negroes of Virginia, with especial reference to the question whether the economic character of the present generation of negroes, as indicated by this test, is inferior or superior to that of the generation which was trained in slavery and freed by the war. The data are derived from the census and from the local assessments for taxation. The property of negroes was first shown separately on the assessment books in 1891, and the last assessment here used is that of 1903, giving an interval of twelve years.

The number of negro farmers in Virginia who owned their farms free of encumbrance in 1890, according to the census, was 13,097. If we assume that the negroes started without property in 1865, the number of negro farmers in the state who acquired full ownership of their farms between 1865 and 1890 amounted on an average to 524 a year. But during the next ten years the number was 913 a year, or 75 per cent. greater. If all farm owners, mortgaged as well as clear, are included, the number was 547 a year from 1865 to 1890, and 1,394 a year, or two and a half times as many, from 1890 to 1900.

On the same assumption that the negroes had no property at the close of the war, the assessments for taxation indicate that they acquired 26,000 acres of land a year from 1865 to 1891, and 38,000 acres a year, or almost half as much again, from 1891 to 1903; and rural buildings to the value of $53,000 a year from 1865 to 1891, and to the value of $110,600, or more than twice as much, from 1891 to 1903.

In proportion to their numbers, the negroes increased their acreage of land, and the total value of their rural real estate, two fifths faster from 1891 to 1903 than from 1865 to 1891, and the value of their rural buildings twice as fast.

The number of negro farmers who owned their farms clear of encumbrance in 1890 was only 26 per thousand of rural negro population, according to the census; in 1900 it was 42. The negroes had only a third as many unencumbered farm owners as the whites in proportion to their rural population in 1890; in 1900 they had half as many.

The assessed value of town real estate owned by negroes was $4,650,000 in 1891, and $6,350,000 in 1903. It increased in considerably greater ratio than the town negro population, while the assessed value of the town property owned by whites did not increase in so great a ratio as the white town population.

In Virginia, at least, the negroes have increased their property holdings more rapidly since the ante-bellum negroes ceased to be an important economic factor than they did while the older generation occupied the stage. In view of this unquestionable statistical fact, it can hardly be doubted that the economic efficiency of the present generation, at least in Virginia, is greater than that of the generation that was trained in slavery.

Railway Conditions in Texas: O. B. Colquitt, State Railway Commission, Austin, Texas.

How much of the stock and bond issues of Texas railroads is 'fictitious' no man can tell without access to the old books of the companies, almost all of which have

passed through the 'wrecking' period, and in many instances new companies formed to take over the property of the wrecked company. The total of stock and bonds outstanding June 30, 1893, the year the stock and bond law went into effect, was $392,726,113, on 9,198 miles of road, an average of $40,250 per mile. The commission's estimate of what it would cost to reproduce all the railroads in Texas on June 30, 1904, was $16,244 per mile. The estimate was made on what it would cost to reproduce the roads—the old roads—in their condition at the time they were valued, the materials, cost of labor, right of way, etc., being figured at average prices prevailing at time of valuation. On the average estimated cost of reproduction, the 9,198 miles of operated railroad in 1893 were worth $149,422,312, showing $243,303,801 of the outstanding bonds and stocks to have been 'fictitious.'

Management, under apparently like conditions, has much to do with state railway regulation. They had equal privileges conferred. Of three examples cited, the first is laid in a populous, rich section, running from north to south, and the earnings and accumulations have been great. Years of operation make a good showing of surplus which is in the hands of its owner in New York.

The second, running from south to north, in a rich and populous section of the state, had a large income from operation, but either spent it in 'riotous living' or so merged it with that of its dominant owner as to show a condition of bankruptcy on its own books.

The third is in a sparsely settled part of the state, unassisted by domination, and aided alone by its own energy and prudence, and with the same rates prescribed by the state for the others, has prospered, and distributed its surplus earnings to the numerous holders of its shares of stock. Which of these three do you say has employed its privileges to the best advantage and to the greatest credit of the state?

This brings us to a discussion of freight rates. What is the proper basis for rate-making? Shall they be fixed with reference to the capital invested? Should they be made with reference to the value of the commerce transported? Should they be fixed upon the theory that they should be 'all that the traffic will bear'? Or must they be fixed and adjusted so as to pay all fixed charges, operating expenses, betterments, etc., and leave something for the stockholders?

If the latter basis should be adopted how would you adjust the rates to meet the showings made by the three roads I have taken for illustration? The management of one road might, on the same rate, with the same tonnage, same capital and investment make money, and another lose. You can never fix rates that will be reasonable to the shipper on that basis unless you have control of the finances and operate the line independently. One Texas line paid out $30 per 100 train miles for maintenance of equipment, while another paid only $15 last year.

If you base rates on the theory that they shall be 'all the traffic will bear,' the movement of freight on such rates will be restricted to the actual, economical requirements of all freight-paying commodities. Such a rule will not stimulate the movement of commodities of small value.

From what I have already said it is also conclusively shown that you can not use the bond and stock issues of the roads as the proper basis for rate-making.

Proposed Solutions of the Railway Rate Problem: H. T. NEWCOMB, Washington, D. C.

This paper applies especially to commercial rates as related to the work of the

interstate commerce commission. This commission is a federal agency of high authority and the law under which it exists is a broad and comprehensive statute which has strongly influenced the economic life of America since its enactment in 1887. It forbids every unreasonable interstate railway rate and every undue discrimination among rates, and the commission has the right to condemn any unlawful rate or practise. Much of the work of the commission is accomplished through its agencies for publicity and by conciliation; at least eighty per cent. of the complaints it receives are settled by its informal and mediatory action; seventy per cent. of its formal orders are voluntarily obeyed. In nearly nineteen years only forty-seven cases of disobedience to its orders have been presented to the courts, and of the thirty-five final decisions rendered all but four have been that the order disobeyed was unlawful. In four cases the orders have been enforced by the courts, thus proving that the power exists when the commission acts lawfully. In addition the Elkins law has proved a prompt and effective remedy for unjust discrimination.

So much for existing law. Many proposals for new legislation are now before the congress and the people. This paper has been prepared especially to point out certain broad principles in connection with them. The measures proposed fall plainly into two classes. There are proposals which contemplate: (*A*) A single act of legislation leaving the enforcement of the law to the ordinary executive and judicial machinery supplemented, as at present, by the interstate commerce commission, and, (*B*) successive acts of legislation, each specially adapted to the conditions peculiar to a particular case.

The conclusion reached from a study of existing methods and conditions is that, with our laws as they are, there is no genuine instance of injustice in interstate railway rates which can not be remedied under the present law, and that the existing remedies can be applied as promptly as those which government provides or can provide for wrong of any sort when the interests concerned are of great magnitude. To adopt the other theory would be to rely on law-made rates instead of rates determined by the market.

Methods of Developing Traffic, Industry and Immigration by a Modern Railway: J. F. Merry, General Immigration Agent, Illinois Central Railroad.

The fact that more than 98 per cent. of the $1,975,174,091 collected and disbursed by the railroads of the United States in 1904 was from traffic, and less than 2 per cent. from all other sources, presents a good and sufficient reason why the railroad companies of this country should employ only the best methods of extending this almost exclusive source of revenue. There are many ways by which traffic may be increased, but the following methods have been, and are still, in use by all modern railroads:

1. A study of the agricultural resources and possibilities of the country on and adjacent to its lines and the encouragement of every legitimate effort to develop them.

2. A careful study of the industrial conditions that obtain in all the territory through which its lines run and the taking of such steps as will permanently locate factories at as many points as practicable for the manufacture of raw material, and the employment of labor and capital.

3. Providing modern equipments and quick service for the handling of merchandise and the products of the farm and factory.

Methods of development by the Illinois Central began with turning its 3,700 acres per mile of road into freight-producing

territory. The grant of 2,594,115 acres was marked at from $1.25 to $2.50 per acre. Soon every public highway was lined with covered wagons from New England and the middle states, from Ohio and Michigan, filled with men, women and children as pioneers in the peopling of the prairies along our line, so that by 1870 the state of Illinois was nearly as densely populated as the east. Before 1880, the fruit commission men at Chicago had never seen a consignment of fruits and vegetables from south of the Ohio River. About that time, as the eastern states could no longer supply the west with table luxuries, this road began experiments with strawberries, peaches and other varieties of fruits and vegetables in Tennessee, Mississippi and Louisiana. Much of this was done on cut-over forest lands supposed then to be of no agricultural value whatever. The first carload from south of the Ohio over this line reached Chicago in 1881. In 1903 there were shipped to Chicago alone 128 carloads of strawberries from points between Grenada, Miss., and Keener, La., not counting the earlier and later shipments by express. In the same year 1,805 cars of vegetables were shipped north from the same territory, including New Orleans. The road had 35 refrigerator cars of 14 tons each in its entire service when the experiments began; since then the company has placed in the service 2,491 cars of 60 tons capacity, in addition to 1,510 fruit cars, making a total of 4,001 cars. From one point in Louisiana 200 carloads of strawberries, and from another in Mississippi 800 carloads of vegetables, were shipped in one season, as grown on land too poor to be cultivated in cotton and thought to be of no value for anything. These fruits are hauled to market in refrigerator cars provided with springs that make them ride as easily as a passenger-coach.

The Restriction of European Immigration: O. W. UNDERWOOD, Member of Congress from Alabama.

During the year ending June 30, 1905, there came into the United States 1,026,000 alien immigrants; a greater number of people than all of the people who came here from Europe between the first landing at Jamestown and the Declaration of Independence, one eightieth of the people of the United States; and in ten years at the present rate it would equal an addition of ten million aliens, or about one tenth of the present population.

From the discovery of America down to the year 1880 the greater portion of the immigrants who settled in North America were from northern Europe. In the meantime the steamship companies had found that immigrants coming to America were a source of large revenue. When they found that this immigration was falling off they adopted artificial means to stimulate it. They found that it was more difficult to induce the people of northern Europe to come to America than it was to encourage immigration from southern and eastern Europe, where the conditions of the people were less favorable, and where they were more willing to leave their old homes. The result has been that the character of the immigration since 1880 has almost entirely changed: out of a total immigration for the year ending June 30, 1905, of 1,026,000 people only 221,019 were of Teutonic origin and 124,218 of Celtic origin. The balance were of Iberic, Slavic and Mongolian origin mostly. Ultimately we must assimilate and absorb these peoples.

We are now getting the weakest of European peoples, instead of the strongest. The steamship companies are indifferent to the quality of immigration if they can only get the quantity. There is scarcity of labor, to be sure; but many of our best

citizens are moving to Canada to escape competition with these very immigrants at home. The remedy is a head tax, increased from two to twenty-five dollars to prevent assisted immigration, and a requirement to read and write the constitution of the United States in some language.

The Jews in Russia: Their Economic and Social Position: I. M. Rubinow, Washington, D. C.

Of the five millions of Jews living in Russia, 95 per cent. live in the pale—that part of Russia in which Jews are permitted to live, and which constitutes only one fifth of European Russia. Only rich business men and professional people are permitted to live outside the pale. Even within the pale a Jew may not live outside the city limits. Many professions and trades and even agriculture are practically forbidden fields. In high schools and universities the Jews must not exceed a small percentage of the total number of the students. Petty commerce and hand trades and factory labor are, therefore, the only occupations left open to the majority of the Russian Jews. The result is congestion in these trades, cut-throat competition and poverty. To these conditions the Russian government intentionally remained blind and encouraged the preposterous claim that the Jews were prosperous exploiters of the Russian people, using the prejudice against the Jew as a safety-valve of the popular discontent, and not stopping short of direct organization of anti-Jewish riots, whenever the discontent became very acute.

But out of these abnormal conditions the remedy is gradually evolving. The poverty and congestion of the towns in western Russia produced a free labor market, which stimulated growth of manufacturing industry. And factories brought with them a powerful labor movement, more powerful for the many battles it had to wage, the battle of the Jew, of the Russian citizen and the horribly exploited workingman.

An organization was formed seven years ago, the so-called 'Bund,' which combined all these elements, and the results of its short activity are wonderful. It shortened the labor day from sixteen hours to ten or eleven, raised the pay of the workingmen and commercial employees about fifty per cent., and besides this narrow activity, has taught the Jews to stand up for their rights, to demand and not to beg reforms, to organize in self-defence against the anti-Jewish excesses, and what is more important, to create a strong movement for a free democratic government in Russia. The movement inevitably had far-reaching psychological effects. The patient, suffering and defenseless Jew of olden days was transformed into the energetic fighter for civic liberty, the enthusiastic labor-union man. The Russian Jew has finally regained his self-reliance and self-respect.

These important changes have a significant bearing upon the question of Jewish immigration into the United States. The Russian Jew, having determined to fight for his rights in his own land, is sure of accomplishing his purpose in the not distant future, and the victory will greatly diminish, if not altogether stop, the Jewish immigration to the United States. In the immediate future, however, due to the awful events in the southern cities, the current of immigration will continue unabated for some time. But the Jewish immigrant, being an ardent union man and enthusiastic warrior for the rights of labor, the usual objections against the immigrant from eastern Europe can not be applied to him; the new Russian Jewish immigrant is not a danger, but a powerful ally, of the American workingman in his struggle for economic and social betterment.

The Child-labor Problem: A Study in Degeneracy: A. J. MCKELWAY, Assistant Secretary, National Child Labor Committee, Atlanta, Ga.

The conditions of the child-labor problem in England at the beginning of the nineteenth century and in some of our American states at the beginning of the twentieth are so much alike, that the foreseeing of the same result is inevitable. Certainly there is no more pressing subject for consideration for patriot or philanthropist than the welfare of the coming race. As President Roosevelt said to our committee only last month, political questions like the tariff or the currency are insignificant, in comparison with a social problem like this. The life is more than meat and the body than raiment. Certainly there could befall a people no greater catastrophe than race degeneracy. It is sufficient to say here that this catastrophe is not only threatening, but already impending.

In the manufacturing states of the north and east the legislative problem has been largely solved and there remains only the problem of the adequate enforcement of the law. The industry which was chiefly cursed by child labor in England is the characteristic and commanding industry of the south, the manufacture of cotton; and the northern problem differs from the southern in being chiefly a foreign problem. It is the children of the French Canadian and the Portuguese and the Greek that demand protection in New England, the children of the Italian and the Slav in Pennsylvania. No child of American parentage has yet been found at work in the sweatshops of New York City. In the south it is especially an American problem, for it is concerned with the depreciation of the purest American stock on the continent. And this gives us another point of comparison between England and the south, namely, the similarity of the racial stock.

The same race degeneracy which progressed for a hundred years in England to its dire culmination is beginning already in the south. There has already been developed in our manufacturing communities a 'factory type' easily recognizable, the children distinguished by their pallor and a certain sallowness of complexion. Early employment tends to independence of parental restraint. The breadwinner becomes a man too, and early marriages are the rule. The wife and mother continues her work in the mill, since the wages of the husband are not enough for the support of the family. What must be the children born of such unions and their children? Diseases of the throat and lungs are common and also diseases peculiar to women, brought on by employment long continued at the critical period of a young girl's life.

We must save these children for their country. We must protect them from the consequences of untimely toil, the sapping of physical vitality, the marring of the mind and the spoiling of the spirit that come with the denial of the rights of childhood.

Why Advancing Civilization in America Increases Crime: Some Methods of Relief: Judge N. B. FEAGIN, Birmingham, Ala.

To train the citizen to live aright, to observe the moral and physical law, so that mankind may attain the highest possible perfection in physical, mental and moral manhood, is the duty of organized society. The Duke of Argyle in the middle of the nineteenth century said that the home, the church and the state were England's greatest civilizing factors. The state, through wise laws, justly interpreted and properly administered, can assure the citizen the protection of life, liberty and property.

and the pursuit of happiness. The wisest economy for the state is the greatest care and culture of the citizen from birth to death. This gives strength to good character and force for good citizenship that will exalt the nation.

Recapitulation of Causes.—(1) Advancing civilization increases crime, because of irrational methods. (2) By dealing with results instead of causes, relying more upon repression and reformation than upon formation and prevention. (3) By allowing officials interested pecuniarily in the arrest, confinement and conviction of offenders to have supervision over them. (4) By releasing offenders upon society worse morally and physically than when arrested.

Some Methods of Relief.—(1) Quicken the public conscience for the amelioration of social and economic conditions. (2) Remedial legislation in providing juvenile courts, detention homes and schools, probation system or suspension of sentence and the indeterminate sentence. (3) Efficient, intelligent and humane officials for the proper enforcement of these laws. (4) The substitution of salaries for fees for officials who deal with offenders. (5) Reliance upon formative and constructive methods rather than adherence to repressive and retributive ideals of justice. (6) A thorough revision of our legal provisions and methods of administration so as to relieve the state of the odium of participation in the creation of criminals.

These methods have passed the experimental stage; they are in accord with the dictates of law and philosophy, of science, morality and religion; and if adopted and wisely enforced in all our states, civilization will continue to advance and crime will decrease.

Race Degeneracy: Professor Jerome Dowd, Wisconsin University, Madison, Wis.

Among savages the degenerate and defective individuals were considered bewitched and hence speedily put out of the world. Even down to the eighteenth century mental and corporal afflictions were largely explained as demoniac possessions. The development of hospitals for the insane gave rise to the science of psychiatry and the effort to trace insanity to natural causes. Then the success of the psychiatrists stimulated the criminologists to inquire whether the moral perversities of the thief, the forger, the murderer, etc., were not also the result of inherited physical and mental defects. A still further step in the study of degeneracy was to inquire if the man of genius was not also, as the insane man and criminal, the result of a deteriorated physical or mental organism. Lombroso in Italy and Nisbet in England have attempted to show a necessary connection between degeneracy and genius. Nisbet cites in his book a long list of great men with the peculiar evidences of degeneracy which characterized each of them. Shakespeare, he says, belonged to a very degenerate stock, the average length of life of the children of his parents being only thirty-two years, and he himself died of a sort of 'epileptic seizure.' Milton was blind at the age of forty-four years, and his daughter Anne was lame and otherwise defective. Only one of his daughters had offspring, and she gave birth to ten children, of whom only three lived to attain adult age.

Advancing a step further in the study of degeneracy, Max Nordau, in Germany, has attempted to show that degeneracy is not a peculiarity of criminals, lunatics or men of genius, but that it is characteristic of all modern civilized races. Many of our celebrated men have all the special stigmata of the criminal or lunatic, but they manifest their defects in a way which escapes general notice. They are, however,

no less injurious to society. Instead of using the knife of the assassin or the bomb of the dynamiter, they use the pen and pencil.

Some sociologists, as Gumplowicz and Le Bon, have taken up the idea of degeneracy and declare that modern civilizations are destined to an inevitable decay and death.

Are there any reliable facts which would support the argument in favor of race degeneracy? Examining into the statistics of the insane, blind, deaf and criminal, the data are so imperfect that it is impossible to say whether conditions are becoming better or worse. The signs of family degeneracy are more serious than those of physical degeneracy or crime. There is no doubt about the increase of divorces and in many countries there is an increase of illegitimate children. Adultery seems to be less offensive now to public sentiment. The New York committee of fifteen recommended its erasure from the category of crimes. Abandonment of children to institutions suggests Plato's state control of child-rearing. In France 80 per cent. of the juvenile male criminals are illegitimate.

In spite of all the facts bearing upon degeneracy there are as yet no positive evidences of degeneracy and no occasion for alarm, but the present conditions and tendencies are far from satisfactory.

Economic Aspects of Accounting and Auditing: F. W. LAFRENTZ, President American Audit Company, New York.

Many states of the union have passed appropriate laws under which accountants may qualify and obtain certificates from proper governing boards.

Accountancy is not only applied mathematics, but also applied economics. The accountant must know the theory of values in order to properly understand his profession; and here is where he must consult the economist. He should guard against becoming a theorist pure and simple, however. It is necessary for him to be practical in the application of theory. He must know, for instance, when to stop in his analytical work, so as not to burden a business with detail that it is unable to carry. In other words, he must learn to adapt system to business and not business to system.

The documents in which the accountant sums up (epitomizes) the transactions recorded for any given undertaking are the balance sheet and the profit-and-loss account. The balance sheet shows, on the one hand, the goods that are owned by the business, and commonly described as assets. Now, the setting up of the assets in the balance sheet means merely the making of an inventory of the things owned; but in order to do that the accountant must set a value upon them. Here is where the knowledge of the accountant is put to the severest test. Not only must he know the valuation of all marketable staples, but he must know how to deal with the difficult problems of used machinery, dilapidated buildings, and that most elusive of all assets—good-will.

On the credit side of the balance sheet he will set up the debts for which the goods owned are a lien, so to speak, and which in case of liquidation must be deducted from the results gained in the disposition of the goods. If the goods are more than sufficient to meet these liens, the residue will be the net worth of the proprietor, the capital of the proprietor. The balance sheet, therefore, states the *condition* of wealth.

The net worth of the proprietor at a given time, when compared with his net worth at a different date, will show the increase or decrease in his wealth—or his profit or loss during the interim—and the reasons for such change will be found in

the profit-and-loss account, for it states the *flow* of wealth during a given period.

This account sets forth six features: (1) The business done as a whole and by departments; (2) the cost of sales, on the same basis; (3) the gross profits, on the same basis; (4) management expenses, which should not vary greatly with the volume of business; (5) profit or loss on the theory that sufficient capital is invested in the business; (6) the net result, profit or loss, after all allowances.

Here, then, we find mathematics and economics going hand in hand in aid of the accountant; for in the theories on which he bases his mathematical conclusions we recognize the theories of the science of economics. The themes of the economist, such as capital, profit, income, expenditure, value, property, labor, are the terms employed here. The forecasts of the economist, based upon economic principles, are brought into contrast with the actual results attained by the accountant. These results ought to be studied by the economist, so that he may keep abreast of the times, because the factors in the production and distribution of wealth change, and calculations based upon ancient conditions must necessarily be modified.

Honest, Safe and Economical Life Insurance: L. G. Powers, Bureau of Census, Washington, D. C.

Fundamental principles on which life insurance is based:

Some important facts relating to life insurance.

Life insurance, to be honest and safe, must fully recognize the scientific facts on which all such insurance is based.

These facts most fully recognized by the so-called old-line insurance companies.

Statement of the practical workings of insurance in such companies, by which they can furnish honest, safe and economical life indemnity.

Conditions under which assessment and fraternal insurance companies are unsafe agencies for securing life insurance, and also under which they may be trusted for furnishing the same.

Limited-term insurance the best form for those needing large life protection but who are temporarily receiving very limited incomes.

Old-line insurance with low expense of management preferable for all who have an income permitting of the accumulation of savings, and who wish insurance for a long term of years.

Old-line insurance with present large expenses of administration less desirable for the average individual for caring for savings and securing insurance than the best managed fraternal insurance companies.

Fraternities will become more scientific in their management and accumulation of reserves, and old-line companies will in time become less expensive in their management, and by both classes of companies the public will come to have more economical life insurance as well as honest and safe insurance.

The Census Returns on Manufactures: Edward Atkinson,[1] Boston, Mass.

The classification of manufactures by the Federal Census leaves much to be desired in the following respects: (1) The collective branches of industry which are conducted in large factories and workshops by great division of labor, distinctly manufacturing, according to the conventional use of that term; (2) the arts which are conducted by the use of modern tools and appliances, but yet remain distinctly

[1] Born, Brookline, Mass., February, 1827; died, December 11, 1905. Mr. Atkinson joined the American Association in 1880. He has been a constant contributor to Economic Science. An incomplete list of titles of articles published between 1877 and 1905, inclusive, credits him with 183 subjects.

mechanic arts, calling for the guiding hand of the artisan, notably the building trades; (3) the lesser branches of industry, both manufacturing and mechanic arts, conducted in small shops by combination of mechanism, improved tools and hand work.

A careful study may enable economists to establish very valuable deductions when these facts and figures are plainly stated. The deduction which I have made from such study as I can give is that the tendency is toward individualism rather than collectivism. That is to say, the arts which are conducted by large numbers of persons under one roof, subject to great division of labor, are becoming more and more automatic, and although giving employment to a large aggregate in each decade, they are giving employment to a less proportion of persons occupied as the decades go by. In some arts one can foresee the time when the only persons occupied will be those who keep the machinery in order and there may be none of the class now called operatives to attend to the product. On the other hand, the arts which require individualism, capacity, mental energy and manual skill, like the building trades, and many other of the arts listed under the title of manufactures, are calling for an increasing proportion of a constantly increasing number. I also find in every art that I have investigated a confirmation of the rule laid down by Henry C. Carey and Frederic Bastiat seventy years ago, namely, "in proportion to the increase and effectiveness of capital, the share of the annual product falling to capital is increased in the aggregate, but diminished in its relative proportion; while the share falling to labor or to the workmen and women is increased both absolutely and relatively."

I find in the history of every art, the course of which has not been interrupted or broken by tariff taxes (these arts being very few in number), that the persons who do the manual, mechanical work of the nation, constituting in the narrow sense the working classes, have been and are securing decade by decade an increasing share or proportion of a constantly increasing product to their own use and enjoyment.

The Twelfth Census of Manufactures: W. M. STEUART, Census Office, Washington, D. C.

At the census of 1900, when it was found that out of the 640,194 schedules secured, 343,233, or considerably more than half, were for the hand trades or for small shops with an annual product of less than $500, and also that the cost of collecting the schedules for the small shops was about the same per schedule as for the factories; for this and other reasons given in part I. of the report of manufactures, it was recommended that these industries be excluded from the twelfth census.

To recapitulate, the reports of the twelfth census show:

1. A clear demarcation between the neighborhood and mechanical trades and the factory industries.

2. There is a provision of law which excludes the neighborhood and mechanical trades from the census of 1905 and it is probable that they will be omitted from all subsequent censuses.

3. All new industries and industries that have developed from the household industries and passed into the factory system, such as the manufacture of textiles, should be considered as a part of the industrial development of the country.

4. The word 'manufactures' is defined in the census reports, but its definition can not be used as a criterion to separate the neighborhood and mechanical trades from the factory industries.

5. The gross value of the annual products of all classes of manufactures can be used to show relative increase.

6. The duplications in the value of products are eliminated in the census reports and either the net or gross value can be used.

7. The average wages should not be ascertained by dividing the total wages by the average number.

8. The number of wage-earners shown in the statistics of manufactures as employed in the different branches of industry can not agree with the number given in the statistics of population by occupations.

Currency Reform and Postal Savings System: Dr. M. Pietrzycki, Dayton, Wash.

It is proposed to create a special department of the government under the title, 'The Bank of the United States,' with powers and duties as follows:

A. To issue all national currency, this currency to be full legal tender without restrictions.

B. To redeem, cancel or destroy currency.

C. To organize and operate a postal savings system in connection.

A. The issuing of the currency is to be made only on bond security and under uniform and strict rules: (1) On national bonds, (2) on bonds of the states, (3) on bonds of the irrigation and reclamation districts, (4) on first-mortgage bonds of railroad companies.

B. This would require of the bank proposed that—(1) it redeem in coin any legal currency presented, (2) as new currency was issued present currency including greenbacks should be retired and destroyed, (3) as matured bonds were paid off corresponding proportions of the national currency should be destroyed.

C. Postal Savings System.—The 'Bank of the United States' should organize and conduct an efficient postal savings system, receiving, under suitable rules, deposits of money from the people, and paying interest on these deposits at the rate of $2\frac{1}{2}$ per cent. per annum, or less, as may be by the 'bank' from time to time determined, and on sums that have been on deposit sixty days or longer.

The government should, therefore, constantly keep a sufficient supply of gold to be able, and must be willing, to redeem the currency on demand.

Our Commercial Relations with Latin America: Harold Bolce, Washington, D. C.

It is customary to speak in jubilant terms of our commercial destiny in Central and South America. Up to the present, America's share in the foreign commerce of the southern islands and republics of this hemisphere is insignificant. The latest figures show that the foreign trade of the countries (exclusive of South America) washed by the Caribbean amounts to $462,000,000. When to that sum is added the value of the external commerce of the Atlantic republics of South America, the total is found to exceed one billion dollars. Of this splendid trade, to reach which no canal is necessary, the United States gets a pitiable ten per cent.

Of that ten per cent., nearly one half consists of food-stuffs, lumber and kerosene, practically non-competitive products. As a people, we have made almost no effort to get the trade of Latin America. But for the presence of American colonies in Mexico and the West Indies, our south-borne exports would be too paltry to enumerate in the totals of American prosperity. At the present rate of our shipments of merchandise to all lands between our border and Patagonia, it will require over one thousand years for the total value to equal the sum of the exchanges in 1905 in the clearing houses of the United States.

We look forward to sailing through the Panama Canal to a large commercial des-

tiny. But we are ignoring a billion dollar commerce on the Atlantic side of the isthmus. We have the wide sea as a trade path to the markets of the West Indies, Central America and the eastern portion of South America. To reach these fields, we have no more need of a canal at Panama than of the Northwest Passage. By the time we complete the Panama Canal, Japan may be the dominant commercial power of the Pacific. Even if the Chinese Empire were to remain friendly to America and the awakening of the whole orient be postponed until we are ready to travel through our waterway, the canal itself would not secure us the commerce of the far east any more than the Atlantic and Caribbean have secured us the trade of the eastern seaboard of Latin America.

JOHN FRANKLIN CROWELL,
Secretary.

NEW YORK CITY.

THE NEBRASKA ACADEMY OF SCIENCES.

THE sixteenth annual meeting of the Nebraska Academy of Sciences was held in Mechanic Arts Hall, University of Nebraska, February 2–3, 1906, under the presidency of Dr. R. H. Wolcott.

Resolutions were passed approving and urging the passage by Congress of the Adams bill providing for an increase in the appropriation granted to the Agricultural Experiment Stations; that creating the Mesa Verde National Park, and the Lacey bill providing for the preservation of American Antiquities.

The following officers were elected for the ensuing year:

President—Dr. S. R. Towne, Omaha.
Vice-president—Professor G. R. Chatburn, Lincoln.
Secretary—Dr. F. D. Heald, Lincoln.
Treasurer—Dr. H. H. Waite, Lincoln.
Directors—Dr. C. E. Bessey, Lincoln; Mr. G. A. Loveland, Lincoln; Dr. J. B. Hungate, Weeping Water; Dr. H. B. Lowrey, Lincoln.

The following papers were presented:

President's Address—Biological Conditions in Nebraska: ROBERT H. WOLCOTT.

Nebraska, owing to its geographical position, topography, climate and vegetal conditions, may be divided into five faunal areas: (1) a wooded Missouri River bluff area, (2) a prairie area, (3) the sand hills, (4) the plains, (5) a pine-forest foothill region in the northwest. These correspond closely to the floral regions. In early days the two wooded regions were sharply limited, but the planting of groves, orchards and shrubbery, together with the extension of the natural growth of timber and thickets, have led to the extinction of prairie and plains forms and the spreading into these regions of woodland species. Further and more pronounced changes are to be expected in the future. Of these areas the first two named belong to the Carolinian life zone as defined by Merriam, the next two to the Upper Sonoran, the last to the Transition. Merriam shows a close correspondence between life zones and crop zones. With the changing biological conditions in the state, agricultural possibilities are becoming increased. Crops may now be confidently expected which under former conditions could not have been secured. A biological survey of the state would bring out these possibilities, supplementing the work done by the experiment station, and furnishing a scientific basis for that work. Such an enterprise would be for the academy most appropriate, and would render its labors of great practical value, and would furnish a powerful argument upon which to base an appeal for support from the people of the state.

The Drifting of Sunspots: G. D. SWEZEY.

Observations of the sun were made every clear day from October 26 to November 24, 1905, and the position of the principal sunspots on the sun's disk was measured.

Taking account of the changing position of the sun's axis during the period in which a sunspot was visible, the projection of the computed diurnal path was compared with the actual apparent path for ten well-defined spots, in order to determine the drift of the spot with reference to the solar surface. Some of them were found to maintain a very constant latitude; others drifted several degrees north or south; contrary to the usual rule, those within fifteen degrees of the equator drifted, if anything, away from the equator and those in high latitude, both north and south, drifted a little towards it.

The period of the sun's rotation as deduced from these ten spots varied from twenty-five to over twenty-eight days, those nearer the equator giving, as a rule, the shorter periods, but with some exceptions.

Ancient Picture-writing on Nebraska Rocks: A. E. Sheldon. (With lantern.)

Observations on Glacial Accumulations of Nebraska: G. E. Condra.

The glacial deposits in this state are thicker, better defined and more important than is generally known. Till composed of clay, sand, pebbles and boulders is about one hundred feet thick in the uplands near Lincoln. An oxidized clay, which is occasionally confused with loess, at places constitutes a large percentage of the till plain. Glacial clay and loess are usually distinguished quite readily by their structure and color. The brownish-colored subsoil in the uplands at Omaha, Nebraska City, Lincoln and Ponca is till, not loess. The till plain lies on Pennsylvanian, Permian, Cretaceous and Tertiary formations. Its western border is poorly defined, grading into a sand plain and concealed by loess. Just how the till and sand plains are related we do not know. Boulders are found in the latter farther west than Fairbury. Tertiary and glacial sands are confused at places. Boulders show in largest numbers where the loess and finer glacial materials have been removed by streams, as on valley slopes. By this means the coarser parts of the till have been concentrated locally as 'boulder areas,' the best known of which are near Endicott, Humboldt, Falls City, Lincoln and Hartington. Further investigation may force the conclusion that Nebraska has more than the one drift sheet which is known as the Kansan.

Bud Rot of Carnations: F. D. Heald.

The study of a troublesome bud-rot of carnations due to a species of *Fusarium* was described. The rotting buds always contained a mite in addition to the fungus. Pure cultures were made of the fungus, and successful inoculations were carried out. The fungus was again isolated and new inoculations made which indicated that the fungus alone was capable of producing the rotting. The experiment tried with inoculations of the mite into the buds did not produce the disease. It was suggested that the mites act only as carriers of the fungus and intensify its severity. The Lawson carnation was noticed as the most susceptible variety.

A New Distome of the Family Holostomeæ: F. D. Barker. (By title.)

The Strength of Nebraska Woods: G. R. Chatburn. (By title.)

The Bumble Bees of Nebraska: M. H. Swenk.

In arranging about six hundred specimens of Nebraska bumble bees and their inquilines contained in the collection of the University of Nebraska, an unusually rich fauna of these insects was found for the state. This collection includes records of seven species of *Bombias,* eight species of *Bombus* and three species of *Psithyrus,* making eighteen species in all, or more than have been recorded for the whole of the United States east of the Mississippi

River. The distribution of these species in the state and their relative abundance was noted, and in addition a brief outline of their general habits was given.

Seasonal Rhythms of Growth: W. W. HASTINGS. (By title.)

The Latest Enumeration of Nebraska Grasses: C. E. BESSEY.

In a recently published catalogue of the grasses of Nebraska in the Annual Report of the Nebraska State Board of Agriculture (1904), one hundred and fifty native and fifty introduced species are recorded. This is the largest number ever included in any authentic list of the grasses of the state. While recent reexaminations of certain specimens make a few changes of names necessary, the aggregates remain as already stated. It is not unlikely, however, that a still more critical study of the wild grasses will add a number of species to the present list. The popular impression that the number of species of grasses in the state is diminishing is erroneous. Of certain species there are fewer individuals, but there are few if any cases in which any grasses have completely disappeared from a region.

The Oil Region around Cleveland, Pawnee County, Oklahoma: E. G. WOODRUFF.

The most important oil field in Oklahoma to-day is the one surrounding the city of Cleveland in eastern Pawnee County. A brief history of this field was given, with notes on the number of wells, the amount and nature of the oil, and the enormous gas flow. One four-inch pipe line carries a stream of crude petroleum night and day; another line of six-inch diameter is almost completed. The city is heated by natural gas from the wells, and street lights burn night and day, while millions of cubic feet of gas are going to waste.

Oil and Gas Possibilities in Nebraska: G. E. CONDRA.

The possibility of oil and gas in paying quantities in Nebraska has led to a demand for a careful stratigraphic study, especially in the southeastern part of the state. The stratigraphic relations of the Carboniferous series of Nebraska to the oil regions to the south was studied during seven trips across Kansas, Oklahoma and the Indian Territory. Certain Pennsylvanian formations and at least two members of the Permian that outcrop in southeastern Nebraska were found to extend, with little change, to near the oil and gas fields. The study of the stratigraphy of southeastern Nebraska has shown that the Cherokee shales, the principal oil-bearing beds of Kansas, lie 2,000 feet below the Nemaha Valley. Only one well has been put down to this depth. Further west in Nebraska, in the region around Cambridge, the possible oil- and gas-bearing formations are the Grandose and the Dakota, but neither formation yields much oil in any region. There are a few favorable indications that oil and gas may occur in paying quantities in Nebraska, but many of the conditions are unfavorable.

Some Structural Peculiarities of the Rice Pistil: ELDA R. WALKER.

Rice pistils show several peculiarities which seem to indicate that they are tricarpellary. In the pistil there are three fibro-vascular bundles. Of these one goes to each of the two style branches and the other bears the ovule. This bundle typically stops a short distance above the ovary cavity near the level at which the style branches separate. However, in a few cases pistils are found with three style branches. It seems then that the style branches of the typical pistil represent two carpels and that the other carpel is reduced, only extending to the top of the ovary. The pistil is then apparently composed of two sterile carpels and the reduced fertile carpel.

The Use of Carbon Tetrachloride with the Soxhlet Apparatus: Roscoe H. Shaw.

Various chemicals have been advocated and used as extractants in the determination of fat in foods and agricultural products. Ether is most extensively used and its use has become official. Carbon bisulfide, petroleum ether and carbon tetrachloride are also used to some extent. The last named has many advantages over the others. It is cheap, it can be purchased pure and its vapor is non-explosive, non-inflammable and non-poisonous. Ether can not be obtained anhydrous and must be kept over sodium and redistilled just before using. It is expensive and its vapor is explosive. The unpleasant odor and poisonous property of the vapors of carbon bisulfide restrict its use. Petroleum ether is a mixture of the lighter oils of petroleum and consequently has no definite chemical composition or boiling-point.

Samples of corn and linseed meal were extracted with both ether and carbon tetrachloride. The heat for those with ether was supplied by a steam bath and for the carbon tetrachloride direct flame with an asbestos plate interposed. Soxhlet's extractors were used in each case. It was found that the tetrachloride made the complete extraction and gave identical results with the ether in about one third of the time required by the latter, and that a previous drying of the samples was unnecessary. Extractions on other grains will be made and reported at the next meeting.

Some Carboniferous Corals from Nebraska: E. H. Barbour.

Forest Planting in Eastern Nebraska: Frank G. Miller.

This paper dealt mainly with that part of the state east of the ninety-ninth meridian. It reviewed briefly the history of forest planting in Nebraska, in which it was noted that the state has about 300,000 acres of planted timber, approximately 250,000, or 83 per cent., of which are in the region east of the ninety-ninth meridian. The observation was also made that in the eastern portion of the state the planted area is decreasing. Owing to the rapid appreciation in the price of land, together with an increased timber supply, due to the efforts of the early settlers, the activity in forest planting so characteristic of pioneer days has gradually declined, till in the past few years the amount of planting done in most parts of the region under consideration has been very small, and this has been more than offset by the large amount of former planting that is being harvested. Tree planting declined very rapidly from about 1894. The outlook for future planting is more hopeful, as there is a distinct revival of interest in forest planting at the present time. In mentioning the purposes for which forest plantings should be made, their protective value was especially emphasized. The ability of wind-breaks and shelter belts to protect planted fields and orchards from the aridity of the wind and thus increase crop production is not only attested by common observation, but has been demonstrated by experimentation. This is one of the most vital questions connected with tree planting on the plains, since the importance of any agency that will retard the velocity of the wind and thus check evaporation becomes at once apparent. For commercial purposes, common cottonwood and willow were recommended for fuel. For fence posts, hardy catalpa, honey locust, green ash, Osage orange, European larch and red cedar were named; while for lumber production, common cottonwood and black walnut are the most available trees.

Cantor's Transfinite Numbers: E. W. Davis.

The Skulls of Syndyoceras and Protoceras: ERWIN H. BARBOUR.

The skull of the Oligocene *Protoceras* with its many horns or protuberances was compared with that of the four-horned Miocene artiodactyl *Syndyoceras*. Though representing widely divergent types, *Syndyoceras* seems to be more closely related to *Protoceras* than to any known form. The main horn-cores or protuberances in *Protoceras* seem to become true horn-cores in *Syndyoceras*. The more prominent distinguishing characteristics of *Syndyoceras* are the four grooved horn-cores; the 'midnares' or 'blow-hole' (of doubtful function); the tube eyes; the incisiform canines and the caniniform premolars of the mandible.

Additional Notes on the Cladocera of Nebraska: CHARLES FORDYCE.

Since the appearance of the two former papers on the Cladocera of Nebraska (Fordyce, 1901 and 1904), the author has found five additional species, which, added to the forty-five previously reported makes a total of fifty species thus far reported from Nebraska. The species described in this paper are embraced in the following three families: Daphnidæ one, Bosminidæ one, Lynceidæ two. The additional species are as follows: *Simocephalus serrulatus* n. var., *Bosnima* n. sp., *Alona quadrangularis* O. F. Müller, *Pleuroxus hamatus* Birge, *Pleuroxus trigonellus* O. F. Müller. These forms are all new to Nebraska; the first two are new to science, and the last three are rare in this country.

The Accuracy of Acquired Habitual Movements: H. L. HOLLINGSWORTH.

Contemporary psychology is paying increased attention to the general subject of movement. While the psychophysics of inactive perception has become fairly well organized, the more active modes have disclosed less regularity and the need is felt for a more careful study in this field. The comparison of series of naïve and practise tests of the accuracy of the standing, walking and sitting reflexes affords the following suggestions:

(1) The lack of uniformity displayed by modes of perception in which movement is involved is due to the complex conditions under which the movements are made, the general activity of the reflex, its functional correlation with static and orientation sense, etc. (2) The extremely delicate discrimination possible to even the most massive reflex is worthy of remark. (3) There is a practical minimum below which the threshold can not be reduced, and this threshold is about the same for all individuals. (4) Practise results may be manifested either in the reduction of the threshold, or, if the threshold remain constant, in the gradual definition and increased certainty of the criteria of judgment. (5) The more activity involved in a movement, and the more closely connected it is with static perception, the more susceptible is the movement to the reduction of the observable difference threshold by practise. The less activity involved the more likely is practise to result in the definition of the criteria. (6) The correlation of sensory and motor factors in the process of learning is seen to be advantageous. The more activity involved in an act of learning, the more quickly will the process be mastered. Since motor correlations are in general more persistent than sensory, it is also probable that the acquirement will be longer retained.

The Composition of Some Unique Feeding Stuffs Used in Nebraska: S. AVERY.

The following unique feeding stuffs were analyzed: burned alfalfa, the soapweed of the sand-hills, a water plant known as hornwort, and the much-abused Russian thistle. Burned alfalfa loses about 700 pounds,

weight per ton, which loss falls mainly on the crude fiber and the carbohydrates. The protein content is high, 24.75 per cent., but experiments indicate that it is much less digestible than the protein of prime alfalfa. Soapweed contains 9.09 per cent. protein and the hornwort 17.68 per cent. The high protein content of the Russian thistle, 17.95 per cent., indicates that the former pest has a feeding value that makes it a source of profit to the western rancher.

New and Little-known Plant Diseases in Nebraska: F. D. Heald.

Notes were given upon the following diseases:

(1) Twig-girdle of the apple due to a *Phoma*-like fungus. (2) Trunk rot of the cherry due to *Schizophyllum commune*. A small orchard of trees five to six years old was completely destroyed by this fungus. (3) Wheat leaf-fungus, *Leptosphæria tritici*. Among other things, its distribution over the same area as the Hessian fly was noted. (4) Bacterial leaf blight of wheat. A bacterial blight of the leaves was common on the leaves of wheat in the breeding-plot at the experiment station and was also observed elsewhere. (5) Bacterial blight of soy bean. This disease was quite serious on soy bean used as an orchard cover crop at the experiment station. (6) Moldy corn due to a fungus provisionally referred to *Diplodia Maydis*, but differing in several points in habit and structure.

A New Limestone in the Indian Territory: G. E. Condra.

This new stone represents an abnormal development of calcareous oolite in the Hunton formation and is underlaid by seventy-five feet or more of Sylvan shale. This stone forms a single massive ledge without distinct jointing and bedding, the thickness averaging ten feet. The formation where exposed is a hogback of the Arbuckle Mountains dipping three to five degrees northeast. The stone is very plainly oolitic, much more so than the Bedford, and approaching the famous English oolite. The spherules range from .5 to 2 mm. in diameter, the largest being in the lower part of the ledge. The spherules are held together by a matrix of clear olive-green crystallized calcite, giving the stone a beautiful surface when polished. The oolite is a very pure limestone, in fact a marble, running as high as 98 per cent. $CaCO_3$.

The stone and the underlying shale are to become the basis of several industries which will furnish building stone, ornamental stone, carbonate, lime, cement, brick, tile and ballast, all of which are in great demand in that section of the country.

The Causes of the Dwarfing of Alpine Plants: Frederic E. Clements.

Preliminary work upon the mountain vegetation of Colorado from 1896 to 1899 seemed to show clearly that the prevailing opinion that light was the primary factor in alpine dwarfing was erroneous. A large number of species was found to exhibit dwarf and normal forms at the same altitude, and often in close proximity. In every case the dwarf form grew in dry soil, and the normal one in wet soil, indicating that the difference was one of water content. Owing to lack of instruments, satisfactory determinations of light intensity were not obtained until 1904. The latter naturally showed no differences in dry and wet habitats at the same altitude. Readings taken at Manitou (1,900 m.), Minnehaha (2,600 m.) and on Mount Garfield at 3,600 m. gave practically the same light intensity for the three altitudes. The greatest intensity on Mount Garfield was 1.2, the intensity at Manitou being 1. This difference is altogether too slight to account for the dwarf habit of alpine vegetation as compared with that of the plains. Accordingly, in 1905, recording psychrometers

were located at the same stations to obtain complete records of humidity. Light readings were again made as for the year preceding with the same results. It was found that the humidity was much less upon the alpine summits than upon the plains. This leads necessarily to the conclusion that alpine plants, compared with those of the plains, are dwarfed because of excessive transpiration, while, among alpine forms, those that grow in dry habitats are dwarfed by virtue of a low water supply.

University Extension and the Prevention of Disease: H. H. WAITE.

Attention was called to the growth of the university-extension movement in the United States during the last decade. The general government and many states appropriate annually large sums of money to defray the expenses of investigating diseases of animals and plants. At the present time only a limited number of individual states have appropriated money and established laboratories for the investigation of disease in man. The importance of educating the people in regard to the origin, means of dissemination and measures to be taken to prevent the spread of infectious diseases, were briefly discussed. The infectious diseases especially considered were tuberculosis, typhoid fever and diphtheria. The excellent chances of recovery from or arrest of tuberculosis in its early stages, provided the patient is given accurate instruction as to the regulation of his daily life, was strongly emphasized. Statistics from all parts of the world prove that diphtheria antitoxin since its introduction has reduced the death rate by more than fifty per cent. Since its administration is attended with little or no danger to the individual, the public should so clearly understand this as to demand its introduction as both a curative and a prophylactic measure.

Tillering in the Corn Plant: E. G. MONTGOMERY.

The 'tiller' in a corn plant is a lateral branch, usually arising at or below the surface of the soil. In dent corn the number of tillers varies from none to three or four, depending largely on conditions. The number developing is directly affected by rate of planting, fertility of the soil, rainfall, or their development seems to be correlated directly with the favorableness of the environment. The following data show the effect of rate of planting when the hills were 44 inches apart each way:

	No. of Plants in a Hill.	No. Tillers Developed.
For every 100 plants,	4	8
For every 100 plants,	3	25
For every 100 plants,	2	76
For every 100 plants,	1	198

In the same way the number of tillers increased on fertile land and in seasons of good rainfall. The tendency to tiller was found to be more or less hereditary, but this tendency was more than overcome in most cases by the environment. Tillers also have an important economic value. On good soil where the stand happens to be below maximum, they are capable of producing good ears. When suckers were removed from a portion of a field for two seasons, the yield was decreased an average of 17 bushels per acre, but the yield where suckers were left on was 81 bushels per acre while it only averaged 64 bushels where they were removed.

Aboriginal Pottery of Nebraska: E. E. BLACKMAN.

The Nebraska aborigine made pottery very much as his European brother did. He used it for burial vessels as the ancients of the old world used the first pottery made by them. He also used it as household utensils. He ornamented it as much as they did, and all the pottery of northern

tribes, both in this country and Europe, has a recognizable similarity, while the same is true of tribes of warmer countries. There is little similarity between the pottery of the Nebraska aborigine and the pottery of the Mexican aborigine. There is much similarity between the pottery of the Nebraska aborigine and the aborigines of England, Ireland and Scandinavia. The pottery which we know to be the oldest in Nebraska shows a greater degree of art than the specimens we know were made just prior to contact with the whites.

Preliminary Work in Experimental Evolution: Frederic E. Clements.

The work done at the Alpine Laboratory at Minnehaha near Pikes Peak during the past six years concerns itself chiefly with measuring the physical factors of the many habitats, and the study of plant and vegetation differences arising from them. In 1905 a beginning was made in the matter of tracing the evolution of new forms. The problem was attacked simultaneously from the three standpoints of variation, mutation and adaptation. Careful observations were made upon variable and mutable species, and a number of plastic and stable species were moved from their original homes to new and widely different habitats. The seeds of a number of species which had already produced new forms by adaptation to two or more habitats were planted in the greenhouse in order to determine to what degree the new characters had become fixed.

Species of Filaria found in Human Blood: H. B. Ward. (With lantern slides.)

Circulating in the human blood at times are found minute round worms which are denominated collectively microfilariæ. They are embryonic forms, and though exceedingly uniform in general appearance, represent at least ten or twelve species of filariæ. Their structure is simple and only imperfectly known in detail, while the general size constitutes the common means of distinction. Certain of these forms manifest a periodicity in their appearance in the peripheral circulation which causes them to be classed as nocturnal or diurnal. In some forms the greatly attenuated vitelline membrane persists as a delicate sheath surrounding the circulating embryo and offers another mark of distinction. It has been shown that some species pass the next stage of their life history in a mosquito, from which they are enabled to pass to a new host when the insect is biting. They reach maturity in the subdermal connective tissue, or in lymph glands, whence the myriads of embryos produced by the female enter the blood to begin anew the life cycle. The life history of other forms is entirely conjectural. A synopsis of known forms was presented.

F. D. Heald,
Secretary.

Lincoln, Nebraska.

SCIENTIFIC BOOKS.

A Bibliography of Physical Training. By J. H. McCurdy, M.D. New York, G. E. Stechert & Co. Published by the Physical Directors' Society of the Y. M. C. A. of North America. Springfield, Mass. 1905. 8vo, pp. 369. Price $3.00.

One of the greatest obstacles that workers and students in the field of physical education have encountered has been the lack of a bibliography on the subject. The literature of physical training embraces such a wide range of topics that several individuals and committees who attempted to compile it, very soon gave up the task. That Dr. McCurdy had the patience and perseverance to keep on with the work for nearly fourteen years is evidence of his ability and his devotion to the cause of physical training.

The author had exceptional opportunities for doing the work thoroughly, for the library of the International Training School, with which Dr. McCurdy is connected, contains

one of the largest collections of physical-training literature, and the files of the Bibliographica Medica, Concilium Bibliographicum, American Index Medicus, Surgeon General's Index of the United States Government, Poole's Periodical Index, etc. Also complete files of the technical periodicals on physical training which are not as a rule classified in Poole's Index.

This volume contains a classification of physical-training literature (pp. 9–16) which is an amplification of No. 613.71 of Dewey's 'Decimal Classification.' This classification has already passed through two editions; it is the result of many years of practical use and is invaluable for library classification of physical training literature.

The index (pp. 17–22) serves as a guide to the foregoing classification and to the bibliography, which fills the last 346 pages of the book.

The bibliography includes some 4,000 titles arranged under eight main heads and numerous subheads as follows:

I. *General Works.* (1) Philosophy, (2) compends, (3) cyclopedias, (4) periodicals, (5) societies and conferences, (6) normal education, (7) systems.

II. *The Subject of Training—Man.* (1) Physical, (2) mental, (3) spiritual, (4) social.

III. *The Exercises—Gymnastic.* (1) Medical, (2) calisthenics, (3) defensive, (4) heavy apparatus, (5) indoor games, (6) developing apparatus.

IV. *The Exercises—Athletic.* (1) Track athletics, (2) field athletics, (3) indoor athletics, (4) outdoor games, (5) outdoor recreations, (6) sporting.

V. *The Exercises—Aquatic.* (1) Boat and canoe building, (2) sailing or yachting, (3) rowing and paddling, (4) fishing, (5) ice sports, (6) snow sports.

VI. *The Organization.* (1) Scope, etc., (2) local organization, (3) salaried officials, (4) methods.

VII. *The Place.* (1) Gymnasium, (2) athletic field, (3) public playgrounds, (4) aquatic plant.

VIII. *History of Physical Training.* (1) Biography, (2) schools, (3) Young Men's Christian Associations, (4) other societies and clubs.

The bibliography includes practically all the literature printed in English up to January 1, 1905, as well as the titles of the most significant books, articles and pamphlets in German, French and other tongues.

The titles of books and articles which are considered most important by the author and his co-workers are indicated by an asterisk.

This book can hardly fail to receive immediate recognition from all workers in the field of physical training, and the more they use it, the more they will appreciate it.

GEO. L. MEYLAN.

The Polariscope in the Chemical Laboratory, an Introduction to Polarimetry and Related Methods. By GEORGE WILLIAM ROLFE, A.M. New York, The Macmillan Co. 1905.

This book differs from most books on polariscopic analysis by laying stress on the use of the polariscope in other industries besides the sugar industry. The author's experience as a technical chemist and his position as a teacher of polarimetric methods at the Massachusetts Institute of Technology qualify him to write understandingly on the subject he has chosen.

The contents of the book embrace a brief discussion of the fundamental principles underlying polariscopic analysis, a description of polariscopic apparatus and laboratory manipulation, a condensed account of sugar-house and refinery methods as well as of the starch industry, and an outline of the application of polarimetry to scientific research and to chemical analysis of sundry substances.

It appears to the reviewer that it would have been of decided advantage to the students of this book if the author had more strongly emphasized the methods of the International Commission, which methods are at the present time the standard methods of Europe and which no doubt will soon find general application in this country.

Concerning the alleged influence of temperature on the specific rotation of sucrose it is stated (p. 44): "Although these values for temperature correction seem well established

by careful investigation, they are disputed by some, and have not yet been applied in commercial testing."

Apparently the author is not familiar with the critical examination of the investigations above referred to, nor with the facts brought out in the recent trial of American sugar importers against the United States government. In that suit government officers in charge of the polarization of sugar imported into New York testified under oath that the application of the so-called corrections made to counteract the alleged influence of temperature on the specific rotation of sucrose, caused the polariscopic test in 30 per cent. or more of the foreign sugars imported in New York, to run over 100 per cent.—the excess amounting to as much as 0.3 or 0.4 of one per cent. In other words, *apparently,* fully one third of all sugar imported into New York is not only chemically pure, but more than chemically pure!

A defect noted in some parts of the book is the lack of logical arrangement of the topics discussed. There is no apparent reason why the notes applying to special instruments (pp. 68–86) should not have been incorporated with or placed in immediate sequence to pages 15–38, on which the author discusses polariscopes.

As the text stands, some thirty-seven pages of discussion on the accuracy of saccharimeter measurements and notes on apparatus and laboratory manipulations, intervene between the description of one type of half-shade saccharimeter—that of Peters, and that of another half-shade saccharimeter—that of Schmidt and Haensch.

It is also questionable whether the joint treatment of technological processes—in sugar-houses, refineries and glucose factories—and of analytical methods used in the control of those processes, is the most advantageous way of presenting the topics.

The book is written in good style, the descriptions of methods and manipulations are concise, yet sufficiently explicit. The tables given are those usually found in books of this description and the bibliography appended cites the more important works of reference. The make-up of the volume—paper, type and print—is entirely satisfactory.

F. G. Wiechmann.

SCIENTIFIC JOURNALS AND ARTICLES.

The first number of the *Journal of Abnormal Psychology,* edited by Dr. Morton Prince, of Tufts College Medical School, and published by the Old Corner Bookstore, Boston, contains the following articles:

Dr. Pierre Janet, Professor of Psychology, College of France: 'The Pathogenesis of Some Impulsions.'

Professor W. v. Bechterew, St. Petersburg: 'What is Hypnosis?'

Dr. James J. Putnam: "Recent Experiences in the Study and Treatment of Hysteria at the Massachusetts General Hospital, with Remarks on Freud's Methods of Treatment by 'Pyscho-Analysis.'"

Dr. Morton Prince: 'The Psychology of Sudden Religious Conversion.'

Dr. John Franklin Crowell, secretary of the Section of Social and Economic Science, American Association for the Advancement of Science, has become a member of the editorial staff of *The Wall Street Journal.*

SOCIETIES AND ACADEMIES.

THE SOCIETY OF GEOHYDROLOGISTS, WASHINGTON.

At the sixth regular meeting of the society, which was held on Wednesday, March 7, the following papers were presented:

Thermal Springs of the Simplon Tunnel: B. L. Johnson.

Tidal Fluctuations of Certain Wells in Japan: F. G. Clapp.

The seventh regular meeting was held March 21, the following paper being presented:

Occurrence of Water in Crystalline Rocks: M. L. Fuller.

The investigation, which formed a part of the work of the division of hydrology of the United States Geological Survey, was undertaken at the writer's request by Mr. E. E. Ellis for the purpose of securing definite information as to the probabilities of obtaining water supplies from granites and other crystalline rocks. The work included a study of the

wells in such rocks in Connecticut, and an examination of the quarries showing joints and other openings affording passages for underground waters. The results show that the prospects for obtaining adequate water supplies are much better than has often been supposed, less than two per cent. of the wells failing to get water, while all but ten per cent. get enough for the purpose for which they were drilled. The yield varies considerably with the character of the rock, averaging thirteen gallons per minute in granite, schist and gneiss, and thirty gallons or more in granodiorite. The wells show little variation of yield, even in dry seasons.

The water occurs wholly in joints, the most favorable points being at the intersection of two vertical systems, or of a horizontal with a vertical system. The average depth of the wells is a little over one hundred feet. In general the amount of water increases down to a depth of two hundred feet, beyond which it decreases. It is not advisable to sink wells to depths of more than two hundred and fifty feet. The yield of the wells is about the same on hills or plains and in valleys, but only about half as much water is obtained from wells on slopes. All of the water is under artesian pressure and a considerable number of the wells actually flow, at least when first drilled.

The occurrence of the water has a very definite relation to the presence of drift, which acts as a feeder to the joints when it is porous and as a confining layer giving artesian pressure when impervious.

M. L. FULLER,
Secretary.

THE AMERICAN CHEMICAL SOCIETY.
NEW YORK SECTION.

THE sixth regular meeting of the section was held Friday, March 9, at 8:15 P.M., at the Chemists' Club.

The program of the evening was as follows:

Specific Atomic Volumes of the Periodic System: CHAS. S. PALMER.

The periodic arrangement of the chemical elements is usually given in one of two forms: One in short and long series; the other in a condensed grouping of all short series. After a popular illustration of the conception of the 'atomic volume,' Lothar Meyer's well-known curve of atomic volumes was discussed. This is definite but very irregular, and with no special geometrical symmetry. By reducing the atomic volumes to a common denomination (as by referring them to the atomic volume of hydrogen as unity) for the ordinates; and by reducing the correlative atomic specific gravities to a similar common denomination (by dividing each atomic weight by its respective absolute atomic volume) as abscissas —a new form of curve is obtained which clearly shows that each independent series begins with an alkali element and closes with a halogen. Hence the second form of the periodic system is in error, except as it is a convenient typographical condensation. Other illustrations of the advantages of the short-and-long series arrangement were given.

The rest of the evening was devoted to a discussion of 'Legislation for Safeguarding the Sale of Narcotic Drugs,' by Messrs. A. L. Manierre, Gilman Thompson, S. H. Adams and Wm. Jay Schieffelin.

F. H. POUGH,
Secretary.

THE ST. LOUIS CHEMICAL SOCIETY.

AT the meeting of the St. Louis Chemical Society, Monday, February 12, Mr. Carl Hambuechen presented a paper on 'Electrolytic Iron.' The paper referred to work done at the University of Wisconsin by Professor Burgess and the speaker. The chief points brought out were that iron can be produced electrolytically at a cost which is within reasonable limits. The electrolyte can be maintained in good condition for months with little trouble and expense. A product has been obtained containing more than 99.9 per cent. iron. The only impurity is hydrogen, which is given off on heating the product. The immediate product is very hard and brittle. It resists oxidation at the ordinary temperature to a remarkable degree. The fusing point of pure iron seems to be near that of platinum. One obvious use of the product would be the making of alloys of iron of exactly known composition, with a view to study-

ing their properties. The investigation is still in progress at the University of Wisconsin. So far a ton of the material has been produced.

C. J. Borgmeyer,
Corresponding Secretary.

THE CLEMSON COLLEGE SCIENCE CLUB.

The sixtieth regular meeting of the club was held on Friday evening, January 19. The following program was given:

Dr. R. N. Brackett: 'The Contact Process of Making Sulphuric Acid.'

Professor F. T. Dargan: 'Modifications in Laboratory Apparatus.'

Dr. L. A. Klein: 'New Developments in the Prophylaxis and Treatment of Tuberculosis.'

Professor S. B. Earle: 'The Internal Combustion Engine with Especial Reference to the Diesel Engine.'

Fred H. H. Calhoun,
Secretary.

DISCUSSION AND CORRESPONDENCE.

THE PHYSIOGRAPHY OF THE ADIRONDACKS.

To the Editor of Science: An article by Professor Kemp in the March number of the *Popular Science Monthly* with the above title treats a subject on which I have been desirous of getting fuller information for some years past, namely, the origin of the mountain and valley forms in the Adirondacks; but there is a certain phase of the subject which still, to my reading, remains in doubt, namely, the age of the faults by which the mountain sides —or valley sides—are determined. The question arises whether the faults may not be relatively ancient rather than 'of no great geological antiquity,' and whether the valley-side scarps which now indicate the course of the faults may not be, not 'obviously the result of faulting,' but the result of differential erosion.

It is well known that the scarps which follow fault lines are of two kinds. Of one kind are those scarps which are the direct result of faulting or displacement, modified more or less by later erosion on the scarp face. Such a scarp is found along the western base of the Wasatch Mountains in Utah; and I believe that a similar fault scarp marks the base of the Rocky Mountains a few miles south of Colorado Springs. In both these cases, the displacement seems to have been progressive and to have continued through so long a period of time that the upper part of the fault face has been much dissected and worn back by erosion; the true fault scarp is seen only along the mountain base, where the face of the most recent uplift is comparatively little changed. It is evident that, as time passes, such fault scarps will be more and more worn back, and that in time they will be topographically obliterated. Topographically obliterated faults are common in the Appalachians where the faulting is of remote date.

Of another kind are those scarps which truly follow fault lines, yet which are directly the result of erosion rather than of faulting. For example, the Hurricane Ledge or escarpment in the Arizona plateaus north of the Colorado canyon. This scarp was originally described as wholly the direct effect of faulting; but later study has given good reason for believing that it is the effect of differential erosion; that the original effect of the displacement was obliterated in a past cycle of erosion, and that in the present cycle the scarp has been brought to light again by the removal of the weaker strata on the west of the displacement, while the more resistant strata remain in strong relief on the eastern side. Similarly in the Triassic formation of Connecticut, numerous scarps in the trap ridges are here known to follow fault lines; yet the faults are demonstrably so old that their original topographic effects were completely obliterated in a past cycle of erosion, and the fault scarps as now seen result from the revival of erosion following a general uplift of the worn-down region and the consequent removal of the weaker rocks on one side of the fault line, leaving the resistant trap sheets on the other side in strong relief. (This statement does not apply to the western faces of the trap ridges, which are merely retreating escarpments entirely due to erosion; but to the oblique escarpments, where the trap ridges are cut off by the faults.) In the same region there are a few narrow graben-like troughs, enclosed by steep walls; they are not due to recent faulting, but to the removal by modern erosion of the zone of shattered

rock that follows a comparatively ancient fault. In all these cases, it is true enough that erosion has been guided by a fault; but it is certainly desirable to distinguish between scarps of that kind and scarps directly produced by faulting.

It is not easy to determine, on reading Professor Kemp's article, whether the scarps that he describes are of one kind or of the other. Certain supposable conditions, not excluded by anything in his article, would allow an ancient date for the faulting, and would leave the freshness of the scarps to relatively modern erosion, especially to glacial erosion. It is of course possible that the full knowledge which Professor Kemp possesses of the rock structures in the Adirondacks may enable him to exclude these supposable conditions.

There is one feature of the Adirondacks which seems to me to favor the idea of a remote date for at least those faults by which the graben-like valleys are determined. This may be made clear by the following alternative considerations. If the graben-like valleys were the result of faulting of so modern a date that their scarps are still steep as a direct result of displacement, it is evident that the date of such faults must be of later date than the general erosion of the region. In this case there should not be expected any particular relation between the course of the older valleys and the course of the new graben. On the other hand, if the faults are of ancient date, the general valleys of the region might have been eroded along them, and might have gained a wide-open expression appropriate to their advanced age; while the graben-like valleys might then be due to more modern erosion —especially to glacial erosion—along the zones of fault-shattered rock. In this case there should be a close association between the direction of the general valleys and the course of the graben. As far as I know the region from its maps the latter relation seems to prevail.

W. M. DAVIS.

HARVARD UNIVERSITY.

TO THE EDITOR OF SCIENCE: Professor Davis has kindly submitted his letter to me before publication and I gladly embrace the opportunity to add a word regarding the points raised. I assume that the relief is admitted to be primarily due to faulting and that the question of faults as against joints or other influences I need not take up. While faults in the central region of crystalline rocks are less easy to demonstrate than in the outer and contrasted sediments, yet in the areas of the latter they are frequent and they can be followed in instances into the mountains themselves.

Generally speaking, the region of the Colorado River can not with justice be compared with the Adirondacks, because in the former we have canyons alone; whereas in the Adirondacks we have both canyons and broad, open valleys of equal depth and believed with reason to be older topographic forms. Rivers, even if following faults, could under the circumstances scarcely yield canyons, since they would be tapped off by the older valleys long before they could accomplish much; but two opposing faults with a dropped strip or a 'Grabensenkung' could. If we had one scarp produced because a stream worked down a dip, on a hard stratum and against a soft one, erosion without faulting could be urged, but, in these old crystallines, we usually have no contrasts in hardness, which would lead to sapping, and in the valleys we very often have precipitous fronts on each side.

The production of the scarps by other processes than faulting chiefly centers around the work of the ice sheet. The question essentially boils down, as soon as we know the country, to the decision whether or not the ice alone was able to pluck away the fronts of single escarpments and to carry off the intervening rock between two so as to leave the 'Grabensenkung.'

Evidences of an old plateau or peneplain are found in certain flat-topped mountains. Dr. I. H. Ogilvie has remarked a striking one on Treadway Mountain in the Paradox Lake quadrangle (Bulletin New York State Museum, No. 96, p. 468) and another appears in Coot Hill in the northeastern portion of the town of Crown Point, Ticonderoga quadrangle. We have imagined these and others like them to be remnants of

the Cretaceous peneplain—Coot Hill, for example, itself consisting of hard granite-gneiss, fronts Lake Champlain with an almost precipitous escarpment 1,200 or 1,400 feet above the flat Ordovician, Beekmantown limestone, which abuts sharply against its base. There is surely a great fault between the two and the question arises is the relief due in large part to a fault-scarp not yet obliterated or did the ice-sheet take away 1,200–1,400 feet of Chazy, Trenton and Utica strata which must otherwise have stretched eastward from it? Or again, did some pre-glacial river aid in the work? My own disposition is to place confidence in faulting of date since the Cretaceous and not yet obliterated.

I have never been able to establish post-glacial faulting either by dislocated drift or broken glacial striæ, although both possibilities have been kept in mind.

As Professor Davis states, the graben-like valleys do run usually with the general structural trend, but there are occasional ones which strike across this direction. The valley of the Cascade lakes, shown in Fig. 7 of my paper, is such an one (*Popular Science Monthly*, March, 1906). The sides are quite steep and lofty and the lakes are almost at the crest of a divide. A similar cross-canyon lies just north. The little cross-valleys mentioned on p. 201 have similar relations.

On p. 203, the fifth line from the bottom, 'Needles' should read 'Noses.' The old New York name for this uplift is the 'Noses.'

J. F. Kemp.

Columbia University.

VARIATION VERSUS MUTATION.

The suggestion of weakness in the mutation theory of evolution given by Dr. Merriam in a recent number of this journal, from evidence afforded by living faunas as affected by geographic environment, contrasts greatly with apparent evidence in favor of the mutation theory advanced by Professor White in the preceding volume. Both are able expositions, but from very different standpoints, the one from living evidence, the other from such information and rational inferences as we have been able to derive from paleontology. The facts in both instances are well known, for no biologist could for a moment deny that geographic isolation plays an important part in modifying and frequently originating species, though to a wonderfully variable extent, some forms remaining constant throughout very extended ranges, while others are much more plastic, giving rise to species or subspecies in almost every large mountain valley. The change wrought in many winged Coleoptera when established on oceanic islands is frequently alluded to, the wings becoming aborted and other modifications supervening which eventually give rise to what must be considered distinct species.

At the same time we must admit that species are succeeded by other species in successive strata of a geological formation, with such abruptness and frequently with such marked divergencies, as to preclude the idea that the modifications could be brought about by simple changes of climate. It would appear that something else has affected the stability of species to give rise to these observed facts, and, as the development of species by mutation has proved to be at least possible, this seems at present to be the most plausible hypothesis in many instances. A so-called sport is much more difficult to comprehend than any modification brought about by visible alteration of environment, and is probably caused by some let-up in the multitude of environmental conditions that hedge about a species in nature and cause it to maintain its constancy. There is no reason to assume that if this sudden change in the surrounding conditions should be maintained the sport might become a firmly established species, and this mode of evolution seems, from paleontological evidence, to have become much more universal at certain epochs of the earth's history than at others.

In other words, there is probably much truth in both the hypotheses that have been advanced to account for evolution, and it seems to me that Dr. Merriam condemns the mutation theory much too sweepingly—there may be a good deal in it.

Thos. L. Casey.

St. Louis, Mo.

SPECIAL ARTICLES.

EPITHELIAL DEGENERATION, REGENERATION AND SECRETION IN THE MID-INTESTINE OF COLLEMBOLA.

IN *Collembola,* a degeneration of the inner half of the epithelial wall of the mid-intestine occurs in connection with each ecdysis. The cells of the mid-intestine become confluent and important changes of alveolation ensue; nearly half the nuclei migrate toward the intima, while the rest of the nuclei remain near the basement membrane; a wall now forms between the two sets of nuclei, dividing the epithelium into two concentric layers. The inner of these two layers degenerates; the cytoplasmic reticulum disintegrates; the nuclear membranes disappear and the chromatin granules become scattered, but remain intact; much of the fluid substance is resorbed into the remaining layer of cells. The disorganized epithelium, surrounded by a peritrophic membrane, is expelled through the rectum shortly after the external moult.

The process is an excretory one. By this means, the rapidly accumulating concretions of sodic urate are removed from the cells of the mid-intestine, as are also, but incidentally, certain unicellular parasites (Gregarinidæ).

The nuclei lost by degeneration are replaced by the mitotic division of the remaining nuclei —this occurring before the inner portion of the epithelium is cast off.

The peritrophic membrane, which always envelopes a food-mass, is formed by the splitting of the intima, and is, therefore, a secretion from the epithelium of the mid-intestine. The wall that divides the originally single layer of cells into two layers, splits into two membranes, one of which surrounds the degenerating epithelium as a peritrophic membrane, while the other forms the new intima of the mid-intestine.

The formation of new cells takes place throughout the epithelium by mitosis; this regeneration does not occur from local centers, or 'crypts,' as it does in other insects; furthermore, no amitotic divisions are found at any time.

Secretion is performed (1) by the general epithelium of the mid-intestine; (2) by special clear cells in the middle region of the mid-intestine; (3) by specialized cells in the posterior region; these last give off proliferations into the lumen, which become constricted off, as free, rounded, cytoplasmic vesicles, which break down in the alimentary canal and mingle their contents with the food (much as in other insects).

The novel rôle of the mid-intestine as an organ of excretion is correlated with the absence of Malpighian tubes in *Collembola.*

JUSTUS W. FOLSOM,
MIRIAM U. WELLES.

ENTOMOLOGICAL LABORATORY,
UNIVERSITY OF ILLINOIS.

EARTHQUAKES RECORDED AT CHELTENHAM MAGNETIC OBSERVATORY JANUARY 24–31, 1906.[1]

1. January 24:

	North-South Component.	East-West Component.
Beginning	2 h. 04 m. 10 s.	2 h. 04 m. 28 s.
Beginning principal portion	2 04 10	2 04 28
End principal portion	2 08 18	2 08 28
End	2 33 56	2 29 48
Maximum amplitude	2.0 mm. at 2 h. 06 m. 32 s.	1.8 mm. at 2 h. 06 m. 08 s.
Average period of waves:		
Maximum	11.0 s.	10.8 s.
End	7.2	8.6

2. January 24:

Beginning	2 h. 42 m. 12 s.	2 h. 42 m. 38 s.
Beginning principal portion	2 43 20	2 43 03
End principal portion	2 46 12	2 45 34
End	2 52 50	2 51 39
Maximum amplitude	1.5 mm. at 2 h. 44 m. 14 s.	2.2 mm. at 2 h. 44 m. 48 s.
Average period of waves:		
Maximum	10.5 s.	12.3 s.
End	7.2	8.6

3. January 24:

Beginning	16 h. 58 m. 50 s.	16 h. 58 m. 20 s.
Beginning principal portion	16 59 20	16 59 20
End principal portion	17 02 50	17 03 30
End	17 10 50	17 08 30
Maximum amplitude	1.0 mm. at 17 h. 01 m. 34 s.	0.6 mm. at 17 h. 00 m. 25 s.
Average period of waves:		
Maximum	11.6 s.	9.2 s.
Beg. prin. portion	9.1	—
End prin. portion	8.8	7.1

[1] Communicated by the superintendent of the Coast and Geodetic Survey, Mr. O. H. Tittmann. The observatory is situated at Cheltenham, Md., in latitude 38° 44′.0 N. and longitude 76° 50′.5 west of Greenwich. The times recorded are

4. January 25:

Beginning	15 h.	47 m.	00 s.	15 h.	46 m.	45 s.
Beginning principal portion	15	47	15	15	49	14
End principal portion	15	48	15	15	50	45
End	15	54	00	15	53	24
Maximum amplitude	1.0 mm. at 15 h. 47 m. 38 s.			1.5 mm. at 15 h. 49 m. 44 s.		
Average period of waves:						
Beginning	3.2 s.			3.3 s.		
Beg. prin. portion	3.4			8.9		
Maximum	3.2			8.9		

5. January 27:

Beginning	5 h.	19 m.	00 s.	5 h.	19 m.	17 s.
Beginning principal portion	5	21	58	5	21	52
End principal portion	5	27	08	5	29	02
End	5	43	00	5	51	27
Maximum amplitude	1.4 mm. at 5 h. 26 m. 58 s.			2.2 mm. at 5 h. 27 m. 02 s.		
Average period of waves:						
Beginning	25.1 s.			26.0 s.		
Principal portion	19.0			16.2		
Maximum	16.8			17.9		
End	13.6			16.0		

6. January 31:

Beginning	10 h.	43 m.	44 s.	10 h.	43 m.	33 s.
Beginning principal portion	10	50	23	10	49	43
End principal portion	11	16	23	11	17	06
End	14	08	00	14	18	00
Maximum amplitude[2]	77 mm. at 11 h. 02 m. 43 s.			66 mm. at 11 h. 07 m. 46 s.		
Average period of waves:						
Beginning	3.6 s.			2.8 s.		
Principal portion	25.2			18.0		
End	18.5			18.0		

Multiplying ratio of both pointers, 10.

Period of north-south component pendulum about 25 seconds, of east-west component pendulum about 20 seconds.

W. F. Wallis,
Observer in charge.

ANALYSIS OF MISSISSIPPI RIVER SILT.

On October 13, 1905, there appeared in Science a complete analysis of the water of the Mississippi River, and toward the close of it the author made the statement that the silt from the water sample had been saved and would be subjected to a plant-food analysis at a later date. Such an analysis has now been completed and the results are submitted in this article. The methods followed were the ones officially adopted by the Association of Agricultural Chemists, and the results are expressed in percentages of the moisture-free sample. It is to be regretted that the carbonic acid could not be determined, but the lack of material made it impossible:

Insoluble matter	67.71
Sol. Si. O_2	.22
K_2O	1.26
Na_2O	0.13
CaO	1.83
MgO	1.64
MnO	0.18
$Fe_2O_3Al_2O_3$ (mostly Al)	17.90
P_2O_5	0.25
SO_3	0.28
Water and organic matter	7.00
Total nitrogen	0.15

Some facts in connection with this analysis are of peculiar interest. In the first place the per cent. of soluble matter is large and the greater part of it is Al. This gives some insight into the origin of the silt. Another noteworthy feature is the large amount of potash and its ratio to the soda. While in eastern soils it is usual for the potash to be in excess of the soda, the proportion seems larger than customary. In western soils the soda is generally in excess of the potash, and this would indicate that the silt analyzed originally came from a semi-arid or humid region. However, considering the analysis as a whole, there would be no question about pronouncing this silt to be an excellent soil. All this plant food is being removed from the land and carried either to the sea or to the mouth of the river. For the sake of argument let us assume that the above analysis represents the average composition of the silt carried by the Mississippi during the entire year. This is doubtless not quite true, but will serve as a basis for some calculations. One estimate of the total amount of silt carried by the Mississippi during a year places the figures at 443,750,000 tons. Assuming this to be true, the following table gives in tons the amount of various substances removed in this silt during the year:

seventy-fifth meridian mean civil time, counting the hours continuously from midnight to midnight.

[2] The maximum amplitudes of this earthquake were too large to be recorded. The pendulums struck the brushes on both sides. The amplitudes given were measured on the trace and are probably much too small.

Fe_2O_3 Al_2O_3	79,431,250
MnO	798,750
CaO	8,120,625
MgO	7,277,500
Na_2O	576,875
K_2O	5,591,250
P_2O_5	1,109,375
SO_3	1,142,500
Total N	665,625
Water and organic matter	31,062,500

For most of these substances it is impossible to assign any definite commercial value, but for four of them it is possible to compute the actual cost of restoring them to the soil in the form of fertilizer. In the following table such calculation has been made. It has been assumed that the potash would be bought in the form of K_2SO_4, the phosphoric acid as superphosphate and the N as $NaNO_3$. The figures are of course not absolute, but they convey a good idea of the loss which the land has sustained.

Value of plant food removed in silt by the Mississippi River during one year:

CaO	$ 40,603,125
K_2O	559,125,000
P_2O_5	110,937,500
N	222,984,375

These figures are stupendous and worthy of careful consideration, and when we consider that this same process of denudation of the land is being carried on by all the streams of the country, to a greater or less extent, we gather some faint idea of the loss to agricultural interest from this cause. A systematic study of this question would be of great value, and should it ever be made, it is believed that it will lead in some localities at least to the employment of measures to check, in some degree, this vast pecuniary loss to the country.

C. H. STONE.

QUOTATIONS.

THE ROYAL SOCIETY.

THE Royal Society, like every other association of human beings, has from time to time to provide itself with a new chief magistrate. More fortunate than the larger society of which we are all members it does this at fixed periods and with dispassionate gravity and decorum. Yesterday witnessed one of these recurrent changes, when, at the anniversary meeting, Sir William Huggins surrendered the presidency of the society into the capable hands of Lord Rayleigh. The astronomer, whose labors have done so much to give English astronomical science the distinguished place it occupies in the astronomical opinion of the world, is succeeded by a physicist who, by the breadth and variety of his research, the profundity of his knowledge, and the skill with which he has carried on the interrogation of nature, will rank among the greatest of those who have promoted that increase of natural knowledge which is the fundamental object of the Royal Society. It is worth noting—as Sir Henry Roscoe noted last night—that both men belong to a class of scientific investigators which, if not an exclusively English product, has certainly found more numerous representatives in this country than in any other. That is the class of men who live *for* science, not *by* science—men whose means render them independent of exertion, whose position offers many temptations to inaction, and whose abilities, if turned to remunerative pursuits, would ensure rich rewards of the kind that satisfies vulgar ambition. To men of this class—men who, according to one definition of amateurs, would have to be called amateurs, but who lift the word high above all vulgar connotation and restore its etymological significance—English science owes a debt that is simply incalculable. In that class, already sufficiently illustrious, we must include men like Michael Faraday, denied by fortune the power to give of their wealth to the cause of science, but nobly content to live in the utmost simplicity upon a pittance less than the wages of a skilled artisan, while working out discoveries that have changed the face of the world. It would be an evil day for England were the succession of gifted enthusiasts to come to an end, not only because their work is of a higher and more vivifying kind than that of ordinary men, but also because we are, and apparently are likely for some time to remain, very far

behind in the organization of professional science. As Sir William Huggins pointed out in his annual address, we are also far behind in the general diffusion of elementary scientific ideas.

The catholicity of the Royal Society is displayed by the fact mentioned by Lord Rayleigh, that all the medals which can be given to foreigners have this year been awarded to men of science in other countries. Assuming, as we must, that this has not happened through any desire to favor foreigners unduly, the pleasure derived from contemplating the impartiality of the Royal Society must be tempered by the inevitable reflection that we can hardly be keeping pace at home with what is done abroad. Peculiar interest attaches in the circumstances of the moment to the presence among us of Professor Mendeléeff, whose brief leave of absence from official duties covers, we believe, no more than the time required to receive in person the Copley Medal awarded to him by the Royal Society. Though his own distinction as a chemist and as a man besides of wide and varied practical ability is a sufficient reason for the award, he modestly and rightly treated it as being also a testimony of sympathy with his country in her present trials. Official good-will is properly expressed through the Russian ambassador, who sat at the side of the president, but the sympathy of intellectual England with intellectual Russia finds welcome expression in the honor decreed to Professor Mendeléeff. The dichotomy is sincerely regretted by the people of this country, who have no other desire with regard to Russia than that she may speedily find a way to reconcile the best thought of her educated people with the spirit of her administration and the form of her institutions.—The London *Times*.

THE MUSEUM ASSOCIATION OF AMERICA.

In response to the invitation extended through the columns of Science and by circular to those who might be supposed to be interested in the formation of a Museum Association, analogous to that which exists in Great Britain and Ireland, numerous replies have been received, not only from all parts of the United States and Canada, but also from various South American countries, and the West Indian Islands. While it is not possible for some who reside at great distances from the city of New York to be present on May 15, all who have written to the undersigned have expressed their sympathy with the movement, and their desire to be recorded as participating in the organization of the association. How many delegates from the various museums of science and art will be present at the gathering in New York on May 15, it is impossible at this writing to state exactly, but that a large number of the museums of the country, both small and great, will be represented is certain. Many of those who intend to be present at the meeting have signified their intention to present papers upon different phases of the activity of museums.

It appears that the coming gathering will be one of interest, and the invitation to all those who are concerned in the work of museums to participate in it is renewed.

W. J. Holland,
Director Carnegie Museum.

Pittsburg, Pa.,
April 14, 1906.

THE COLD SPRING BIOLOGICAL LABORATORY.

The seventeenth session of the Biological Laboratory of the Brooklyn Institute of Arts and Sciences, located at Cold Spring Harbor, Long Island, will be held, beginning July 5 and will continue for six weeks. Investigators may, however, be accommodated for a much longer period. The courses offered will include one in Field Zoology by Dr. C. B. Davenport, of the Station for Experimental Evolution, Carnegie Institution, and Mr. H. E. Walter, of Harvard University; Bird Study, by Mrs. Walter; Comparative Anatomy, by Dr. H. S. Pratt, of Haverford College; Invertebrate and General Embryology, by Professor H. E. Crampton, of Columbia University, and Professor W. J. Moenkhaus, of Indiana University; Animal Bionomics and Evolution, by Dr. Davenport; Cryptogamic Botany, by Professor D. S. Johnson,

of Johns Hopkins University, and Mr. H. H. York, of Columbia University; Ecological Botany, by Dr. E. N. Transeau, of Alma College, and Microscopic Methods, by Mrs. Davenport.

Among the improvements at the laboratory is a new fire-proof dormitory and dining hall, which is promised by the opening of the session. This building is a gift to the laboratory by Mrs. E. G. Blackford as a memorial to Mr. Blackford, the first president of the board of managers of the laboratory.

The laboratory fee, including all privileges, is $30. Board and room costs from $6 a week up. The investigations carried on at the laboratory deal principally with an analytical study of the bionomics of plants and animals of the harbor and surrounding country.

Copies of the announcement may be obtained on application to the director, Dr. C. B. Davenport, Station for Experimental Evolution, Cold Spring Harbor, Long Island, N. Y.

Mrs. E. G. Blackford has given to the Biological Laboratory of the Brooklyn Institute of Arts and Sciences at Cold Spring Harbor, Long Island, a building in memory of her husband, who was the prime mover in the establishment of the scientific community at that place, which includes the Station for Experimental Evolution, Carnegie Institution; The Biological Laboratory of the Brooklyn Institute, and the New York State Fish Hatchery. Mr. Blackford was the first president of the board of managers of the biological laboratory, from 1888 until his death in December, 1904. The building, which will cost $10,000, will be furnished by Mr. Blackford's daughters. The building will be constructed of reenforced concrete. The main floor contains an assembly room, 32 x 29 feet; a dining room, 32 x 49 feet, and a kitchen and pantry, 20 x 36 feet. The dining room and the adjoining veranda, 18 x 28 feet, command a fine view of the harbor. The second and third floors will be devoted to dormitory purposes.

TESTIMONIAL TO DR. J. BRIQUET.

IN view of the great services rendered by Dr. J. Briquet during the International Botanical Congress of Vienna in questions of nomenclature, a number of members of the congress decided to organize an international demonstration in his honor, and a committee consisting of the following members was formed: Messrs. N. L. Britton, T. Durand, A. Engler, Ch. Flahault, J. W. C. Goethart, H. Harms, H. Hua, C. F. O. Nordstedt, E. Perrot, D. Prain, C. Schröter, O. Stapf, W. Trelease, H. M. Ward, E. Warming, R. v. Wettstein and J. N. Wille.

A circular letter issued by the foregoing body resulted in the subscription of a sum amounting to 2,615 kronen, from the following sources:

	Kronen.
Belgium (by T. Durand)	94
British East Indies (by D. Prain)	54
Denmark (by E. Warming)	102
Germany (by A. Engler and H. Harms)	372
France (by Ch. Flahault and H. Hua)	534
Great Britain (by O. Stapf)	203
Italy (O. Mattirolo)	10
Holland (by J. W. C. Goethart)	60
Norway (by J. N. Wille)	40
Austria and Hungary (by R. v. Wettstein)	397
Russia (by A. de Jaczewski)	63
Sweden (by C. F. O. Nordstedt)	41
Switzerland (by C. Schröter and E. Burnat)	242
United States of America (by N. L. Britton and W. Trelease)	403
Total	2,615

The funds thus obtained were devoted to the purchase of a gold watch with congratulatory inscription in addition to a cheque for 2,000 francs for the furtherance of Dr. Briquet's scientific work and an illuminated address, as a grateful recognition of his labors on behalf of botanists.

The presentation afforded the occasion for a friendly gathering in Geneva on January 13, 1906, arranged by MM. E. Burnat and P. Chenevard; Mr. C. Schröter made the presentation in the name of the committee.

JAMES MILLS PEIRCE.

THE Faculty of Arts and Sciences of Harvard University has adopted the following

minutes on the life and services of the late Professor Peirce:

"The Faculty of Arts and Sciences desire to put on record their sense of the great loss which they have sustained in the death of Professor James Mills Peirce.

"Born in Cambridge within sound of the College bell, a member of the faculty of Harvard College at twenty, serving for nearly fifty years, not as teacher merely, but successively as secretary of the academic council, as dean —and almost as father—of the graduate school, and as dean of the faculty of arts and sciences, he spent the whole of a long life in and for the university.

"He was an admirable teacher, steeped in his subject, not buried in it, and always in close sympathy with his students, to whom he was ever a generous and inspiring friend. Broad-minded and many sided, his scholarship was of that wide, human kind which unites learning with recognition of every accomplishment of grace of life, with interest in every intellectual problem, and with good will to every earnest man. All his work was characterized by thoroughness and finish, and by a kind of fervid loyalty. He had a high and large conception of academic freedom, and, in age as in youth, he looked forward and not back. Of a peculiarly lovable nature, courteous and kindly, he was known to all who met him for his friendly greeting, his earnest speech, at once measured and impetuous, and his scorn of everything narrow, or crooked, or mean."

SCIENTIFIC NOTES AND NEWS.

Notice has been received that Professor Theodore W. Richards has been designated by the German government as Harvard visiting professor at the University of Berlin for the academic year 1906–7. Professor Richard's term of service will probably fall in the second semester.

Dr. Thomas A. Jaggar, Jr., professor of geology at the Massachusetts Institute of Technology and assistant professor at Harvard University, sailed for Europe on April 12 to visit the scene of the present eruption of Vesuvius. His special object is to study volcanic phenomena along certain lines of observation which he followed at Mt. Pelée in 1902, and to make a collection of rocks, volcanic deposits and photographs. Professor Jaggar has undertaken this expedition at the request of Mr. Alexander Agassiz, and has been granted six weeks' leave of absence for the purpose.

Dr. William H. Welch, professor of pathology at the Johns Hopkins University, has been elected an honorary member of the Gesellschaft der Aertze of Vienna.

President William F. Slocum, of Colorado College, has been elected a member of the board of the Carnegie Foundation for the Advancement of Teaching in succession to the late President Harper.

The title of emeritus professor of zoology has been conferred by the University of London on Professor E. Ray Lankester, director of the British Museum of Natural History.

The Paris Geographical Society has awarded a gold medal to Major C. H. D. Ryder for his geographical work in connection with the Tibet Mission.

We learn from *The Harvard University Gazette* that the Société Asiatique of Paris recently elected Professor Charles Rockwell Lanman, of Harvard, an honorary member. The society was founded in 1821, and its honorary list numbers twenty-nine. At the same meeting, the like distinction was conferred upon the assyriologists, Delitzsch of Berlin and Pinches of the British Museum, Rhys Davids, the historian of Buddhism, the Sanskritist Pischel of Berlin, and the well-known Bible critic, Wellhausen. The Royal Society of Sciences of Göttingen, Prussia, founded 1751, has also elected Professor Lanman to membership. Four other Americans now share the same honor: Mr. Alexander Agassiz and Professor Gross, of Harvard, Professor Simon Newcomb, of Washington, and Professor Penfield, of Yale.

Professor Raphael Meldola, F.R.S., professor of chemistry at Finsbury Technical College, has been made an Officier de l'Instruc-

tion Publique of France by the French Minister of Public Instruction for services rendered in connection with the foundation of the Alliance Franco-Britannique, of which organization he is the honorary secretary.

ANNOUNCEMENT is made in the *Harvard University Gazette* that Professor Richards has recently received an additional grant of $2,500 from the Carnegie Institution at Washington, and Assistant Professor Baxter one of $1,000.

THE Academy of Sciences in Munich has made a grant of 500 Marks to Professor Oscar Schultze, of Würzburg, for an investigation of the minute anatomy of the electrical organs of fishes, and a grant of 2,500 Marks to Dr. Rosz, curator of the Botanical Museum at Munich, for zoological and botanical studies in Central America.

AT the British Meteorological Office Mr. R. G. K. Lempfert, M.A., has been appointed superintendent of the statistical branch; Mr. Ernest Gold, B.A. (Cambridge), third wrangler, 1903, and natural sciences tripos, 1904, has been selected for appointment as superintendent of the instruments branch.

DR. ANDING, professor in the University of Munich, has been appointed director of the observatory at Gothe.

DR. PAUL GUTHNICK, of Bothkamp, has been appointed astronomer in the Royal Observatory at Berlin.

IT is announced that Professor von Recklinghausen, who has been head of the Pathological Institute of the University of Strasburg since it was constituted a German university, will retire at the end of the current semester. Professor von Recklinghausen is in his seventy-third year.

MR. M. L. FULLER, of the Division of Hydrology of the United States Geological Survey, gave a course of lectures at the University of Chicago during the week beginning April 2, on the hydrographic and hydrologic work of the survey, including stream measurements, flood studies, studies of underground waters, investigations relating to the quality and uses of water, and the engineering work of the Reclamation Service.

THE fourteenth 'James Forest' lecture of the British Institution of Civil Engineers will be delivered by Mr. R. A. Hadfield on May 2, the subject being 'Unsolved Problems in Metallurgy.'

A COMMITTEE has been formed to raise a memorial to the late Professor von der Goltz, formerly director of the Bonn-Poppelsdorf Academy. A marble bust will be erected in the academy and scholarships will be established.

WE learn from *The Auk* that Dr. Paul Leverkühn, a corresponding fellow of the American Ornithologists' Union, died suddenly of pneumonia at Sophia, Bulgaria, on December 5, 1905, in the thirty-ninth year of his age. He was a private secretary to the Prince of Bulgaria, and director of his scientific institutions and library. He was the author of a large number of ornithological papers, many of them bibliographical and biographical. Among the latter may be mentioned his biography of the three Naumanns in the first volume of the new edition of Naumann's 'Vögel Deutschlands,' later issued separately.

THE death is announced of Dr. H. Lorber, associate professor of physics in the University of Bonn.

THE annual meeting of the American Social Science Association will be held in New York City on May 2–4.

AT a meeting held at Chicago, on March 31, an organization was effected of the State Geologists of the Mississippi Valley. Messrs. Lane, of Ohio; Norwood, of Kentucky; Blatchley, of Indiana; Buckley, of Missouri; Haworth, of Kansas; Bain, of Illinois, and Assistant State Geologist Bownocker, of Ohio, were present. W. S. Blatchley was made chairman and H. F. Bain secretary. It is proposed to arrange for field conferences from time to time and for the frequent interchange of reports and notes of progress among the members of the association. It is expected that through friendly criticism and advice the work of the various surveys may be unified and improved.

The third annual meeting of the Botanical Symposium will be held from July 2 to 9, at Mountain Lodge, Little Moose Lake, Old Forge, N. Y. Through the courtesy of the members of the Adirondack League Club, the privilege of occupying the Club House for one week is extended to the members of the conference. Tickets should be bought to Fulton Chain Station on the Adirondack Division of the N. Y. C. & H. R. R. Single fare from New York City $6.46. Board $2.50 to $3.00 a day. Stages will meet the party at Fulton Chain Station. Botanists are requested to notify Mr. Joseph Crawford, secretary, 2824 Frankford Avenue, Philadelphia, Pa., if they intend to attend the symposium.

In an account of the recent jubilee of the Academy of Science at St. Louis, it was stated that this academy was the oldest body of its kind west of the Alleghenies. A correspondent reminds us that the California Academy of Sciences was organized on May 16, 1853, and celebrated its fiftieth anniversary nearly three years ago.

Nature states that the government of India has decided, with the approval of the secretary of state, to establish an institute in India as a center for practical instruction of medical officers and subordinates in the use and management of Röntgen ray apparatus, and as a depot for the storage and repair of such apparatus. The institute will be located at Dehra Dun, and will be under the superintendence of an officer of the Indian Medical Service.

UNIVERSITY AND EDUCATIONAL NEWS.

We learn from *The Evening Post* that the report of the royal commission of the University of Toronto recommends that financial support of $275,000 a year be given by the province, and an endowment of at least one million acres of land.

It is said that the failure of the legislature to appropriate $50,000 to the Johns Hopkins University will delay indefinitely its removal to the new suburban site.

The cornerstone of the engineering building for the University of Tennessee will be laid on April 23.

The Chemical Laboratory of the Johns Hopkins University has been remodeled in part, so as to accommodate the growing number of graduate students in the various branches of chemistry. A part of the second story has been divided into six smaller rooms adapted to advanced students carrying on research. These rooms will be occupied by those who are working in physical chemistry. This new arrangement will relieve the congestion which had gradually come to exist in the laboratories originally designed for organic chemistry, due to the fact that more and more space had to be provided in them for the work in physical chemistry. The three divisions of chemistry—organic, inorganic and physical—will each have its own separate quarters, but they will all be closely related, as in the past.

The Grand Trunk Railway is offering two free scholarships, covering four years' tuition in the faculty of applied science of McGill University, subject to competitive examinations, to apprentices and other employees of the company under twenty-one years of age, and to minor sons of employees.

The University of Southern California at Los Angeles, Cal., will elect an assistant in the department of botany for next year at a salary of about $700. The botanical and zoological laboratories, recently completed, have now been furnished throughout, and the new equipment has been received.

At a recent meeting of the board of trustees of Indiana University, Dr. E. R. Cumings was promoted to the position of associate professor of geology, and Dr. J. W. Beede to that of assistant professor of geology.

Professor E. A. Minchin has resigned the Jodrell chair of zoology of University College in view of his appointment to the new chair of protozoology in the University of London. The council of University College will shortly proceed to fill the vacancy in the Jodrell chair of zoology thus created.

Dr. C. von Wisselingh, of Amsterdam, has been appointed professor of mathematics at Groningen.